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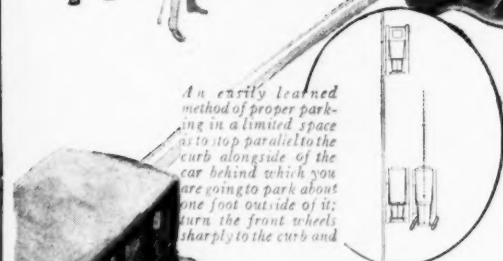
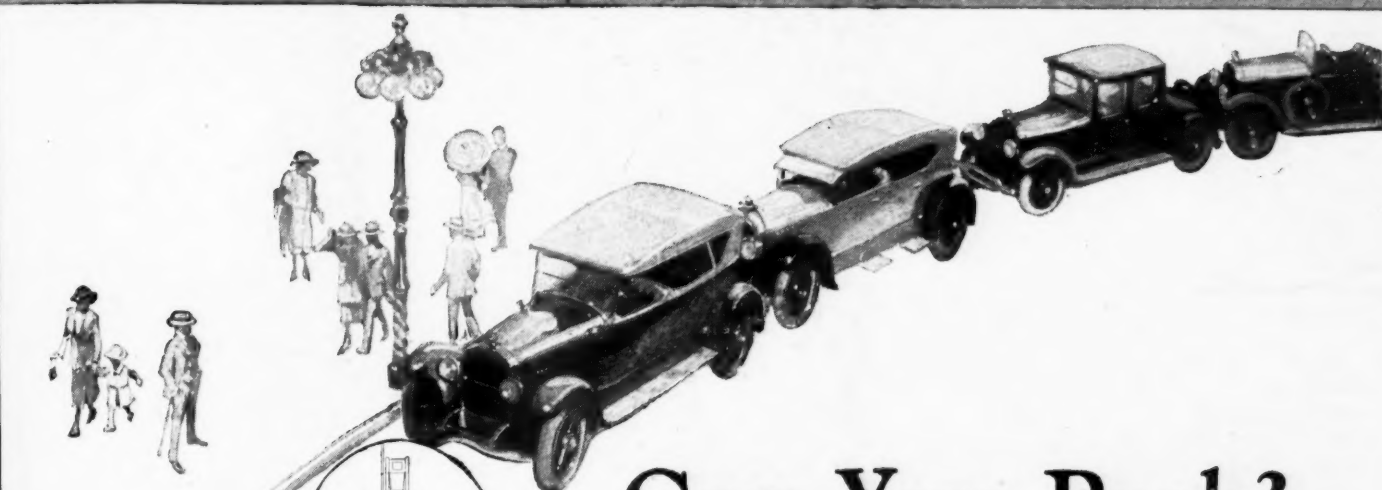
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

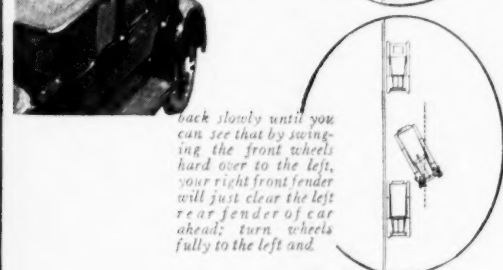
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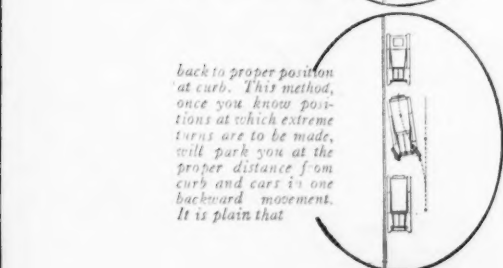
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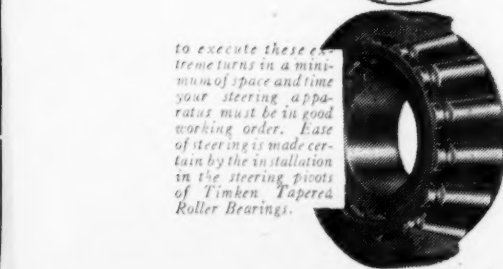
An easily learned method of proper parking in a limited space is to stop parallel to the curb alongside of the car behind which you are going to park about one foot outside of it; turn the front wheels sharply to the curb and



back slowly until you can see that by swinging the front wheels hard over to the left, your right front fender will just clear the left rear fender of car ahead; turn wheels fully to the left and



back to proper position at curb. This method, once you know positions at which extreme turns are to be made, will park you at the proper distance from curb and car in one backward movement. It is plain that



to execute these extreme turns in a minimum of space and time your steering apparatus must be in good working order. Ease of steering is made certain by the installation in the steering pivots of Timken Tapered Roller Bearings.

"Ask him to explain it"

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What has been called a most important contribution to the literature of the Automotive Industry, a really usable and readable booklet entitled

"Good Driving Is Mostly NICE-STEERING"

will be sent upon request.

Dealers and salesmen—everyone—are finding this an invaluable treatise.

It does help!

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A factor of consequence in the building of fine automobile bodies is the installation of hardware.

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*Largest Manufacturers of Automobile
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLVII

NEW YORK—THURSDAY, AUGUST 24, 1922

No. 8

Conditions Favorable for Selling in the South

Offers great potential market for automotive products. Larger cities certain to take cars. Good cotton crop prospects indicate brisk fall buying in all sections. Truck market fair in cities, poor on farms. Tire prices demoralized. Tractor market improving.

By James Dalton

AS an automotive market the South possesses wonderful possibilities. It is a good market to-day and in the next decade it will be one of the best in the United States, if not the best. Sales in the larger centers are not by any means dependent solely on cotton or other crops. The South isn't broke and it's willing to spend its money for the things it wants.

Industrial development of the great territory south of Mason and Dixon's line has just begun, but even to-day it's difficult to find a town which isn't more or less of a manufacturing center. It's hard to realize, but it's none the less true that there are more cotton spindles in the Carolinas than there are in Massachusetts. Almost any town in the South with more than 5000 population can tell a real romance of industry.

HERE is the first of the series of articles about conditions in the South which we announced last week. Mr. Dalton has just returned from a trip through the important commercial centers and in this article he tells something of what part of the South is a good market for automotive products and some of the sections which offer the best sales possibilities.

Future articles will discuss:

The southern dealer and his relations with the manufacturer.

Credit and general conditions in the South.

Highways and their relation to motor vehicles, especially trucks.

Why Henry Ford wants Muscle Shoals.

The North never has looked upon the South as anything much but an agricultural district. Practically the only city which is known universally as a manufacturing center is Birmingham. There probably are few people in the North who ever have heard of Johnson City, Tenn., or La Grange, Ga., or Huntsville, Ala., as textile centers.

While the South is coming fast commercially and will grow still faster each year, it is undeniable that cotton still plays an exceedingly important part in its affairs. Diversification of crops is being preached and the propaganda is bearing fruit everywhere, but it has been undertaken generally only in Alabama and North Carolina. Cotton, therefore, still is the great money crop and it probably always will be, but the time will come

when the failure of a single cotton crop will not plunge seven or eight states into gloom.

It is true that as an automotive market the South is "spotted," but if any passenger car companies are not doing a good business in the cities and towns there is something wrong with their dealers or their products. The character of the dealer and the service he gives probably has more to do with sales in that section than it does in other parts of the country.

Sales of automobiles are good in such cities as Atlanta, Birmingham, Memphis, Chattanooga, Knoxville, Nashville, Winston-Salem, Roanoke, Richmond and New Orleans as well as scores of smaller cities. They have been good since May and there has been nothing like a mid-summer decline.

SALES in the rural sections depend entirely upon the crops, particularly cotton. The great staple of the South exerts an undeniable influence, also, on business in the cities. Cotton, up to a certain point, determines the morale of at least a half dozen states.

The outlook for cotton is better to-day than it has been for a long time. In some sections it was late getting started and in most districts the boll weevil is doing more or less damage, but the outlook is in no sense discouraging. The South has come to look upon the weevil as an unwelcome but permanent guest. It has been in Texas so long, for example, that the planters there do not worry about it particularly.

Big planters, bankers and business men in the South are a unit in making this statement:

"Cotton is making much better than an average crop. It is improving day by day in some districts and is deteriorating in others. The size of the harvest will depend in considerable measure upon the weather for the

next few weeks, but the outlook is highly encouraging.

"If the cotton crop this year aggregates from 11,000,000 to 11,500,000 bales, which there is every indication it will, and if the price remains around present levels, the entire South will enjoy a period of great prosperity and will offer a splendid market for motor vehicles."

Expectations of a good-sized crop are founded on crop reports carefully compiled each week. Predictions of a good market are based upon the fact that there has been a carry-over of only 4,900,000 bales from the last crop and that the prospective demand will be at least 15,000,000 bales. It will be seen, therefore, that with a crop of around 11,000,000 bales the planters scarcely can fail to get a fair price which would be between 20 and 25 cents. Thoughtful men in the South would prefer to have cotton stay around that level rather than rise higher. If it goes much above 25 cents they fear it would result in another period of inflation.

The cotton districts, naturally, will offer the best markets for automotive vehicles if the crop is good and prices fair. The tobacco sections of Kentucky and North Carolina will rank next as markets and the rice and cane fields of Louisiana will rank third.

It does not follow that every county in the South will be a good market for automotive products. Cotton may be good in one county and the crop may be a failure in counties on either side of it, because of the weevil or other local conditions. It is evident, therefore, that a careful analysis must be made of local conditions if manufacturers are to spot the best markets.

Careful study and analysis of marketing possibilities appears to be more important in the South than in almost any other section of the United States. Conditions are more diversified and they differ from year to year. A county which may be a good auto-

Assuming that crops will be good, as they probably will be, generally speaking, the following outline will give a birdseye view of some of the best prospective markets in several States:

North Carolina

The eastern section is one of the best truck markets in the South.

The prosperous Piedmont section.

Winston-Salem is the center of one of the best manufacturing districts in the South. It has many textile mills and is surrounded by a rich cotton and tobacco country.

Durham is a tobacco center.

Hickory has important wagon manufactures.

High Point is the southern furniture center.

All the smaller towns in this territory also are promising markets as well as the farms.

South Carolina

Not quite so good as North Carolina as a whole but ranks second in cotton production.

The northwestern corner of the State, in which are located Greenville, Spartanburg and Newberry, is the best field for development and offers good sales possibilities. Greenville has become one of the textile centers of the South and practically all the towns in this territory have cotton mills.

Georgia

Prospects in the northern part of the State are fair; in the central part they are not so good and in the south fine. It ranks third in cotton production.

Sea island cotton and other cotton of exceptional quality is grown in the Savannah district and the outlook for a good crop is exceedingly bright.

Bulloch county, north of Savannah, of which Statesboro is the county seat, will be a good market.

Savannah, the trading center of the finest cotton belt, is an important distribution and shipping center.

Atlanta, in itself an important manufacturing city, is one of the leading distribution and financial centers of the South. It is a good market to-day and will continue to be, regardless of crops.

Albany has had a building boom. It is the center of a good cotton district as well as of the pecan growing industry.

Gainesville, Columbus and La Grange are textile centers.

Fort Valley and the district south of Macon have had wonderful peach crops.

Tennessee

Practically the entire State holds good promise. Its crops are more diversified than those farther south and they are all good. Middle Tennessee is a fine farming country with wheat and live stock.

Chattanooga is an important manufacturing city which is growing rapidly. It has important iron industries and ranks second in the country in the production of boilers. Hosiery manufacturing has become very important and is expanding rapidly.

Knoxville and Johnson City in the mountains have had booms.

The district around Nashville and Clarksville and up into Kentucky grows much tobacco and the crop has been good with good prices prevailing.

Memphis, in the southwestern corner, with large parts of Arkansas and Mississippi tributary to it, is one of the richest distribution centers in the South.

mobile market this season may have a crop failure next year and offer nothing. One county may have good crops and provide many car buyers while counties on either side of it may have crop failures.

Georgia, for example, is divided roughly into three parts—north, central and southern. The extreme north is mountainous and undeveloped. A little farther south is a fairly good fruit country but practically all the section north of Atlanta, except perhaps the larger towns, can be safely disregarded as a market.

The central section, with Atlanta in the extreme north of it, is fairly good sales territory. Atlanta is in a class by itself. It has a great deal of wealth and is one of the great financial as well as manufacturing centers of the entire South. Cars always can be sold there.

With a good cotton crop there will be sales prospects in every village and on almost every plantation south of Macon clear to the Florida line and along the coast from Savannah south.

A similar analysis can be made in almost every Southern State, but some are more spotted than others. Practically all of Tennessee, Alabama and Mississippi are good. Cotton is grown in all sections of Alabama and Mississippi, and while the crop is not by any means uniform, there will be good markets in all sections of these States unless there is very rapid deterioration. Alabama is making greater progress than its neighbors in diversification of crops. There is no great staple in Tennessee.

Summarizing sales possibilities for passenger cars in the South these statements can be made with a reasonable degree of assurance:

All the larger cities are good markets for cars in all price classes, especially between \$1,000 and \$2,500.

The smaller cities offer fair prospects for low and medium-priced cars and will be good markets if the

crops mature satisfactorily.

Some live prospects for low and moderate priced cars can be found in most villages, especially among merchants and professional men who are beginning to collect bills they have carried on their books for two years.

The farms will offer myriads of prospects for cheap and medium-priced cars if the crops, especially cotton, are as good as they promise to be.

SO far as trucks are concerned, there is a fair market for them in the larger cities and towns, but very little on the farms except for those in the lowest price classes. Manufacturers are using more and more fairly heavy trucks. Merchants are using lighter vehicles for delivery purposes. The market is vastly better than it was a year ago, but still leaves much to be desired. Comparatively few farmers are using trucks, but contract trucking of crops to market is developing in the rural districts. The fruit industry is fairly well motorized, but most Southern farmers contend they need trucks only for three or four weeks of the year at most.

The tractor market is not brisk, but it is getting steadily better for those in the lighter class.

City markets for automobile accessories and supplies are good but large stocks are not carried.

There is a rapidly broadening market for garage equipment and supplies in rural sections.

The tire market is good but prices are absolutely demoralized and dealers are selling them for anything they can get, which returns even a very small profit. There are few exclusive tire dealers and most of them operate battery sales and service stations. Tires and accessories are sold at many of the gasoline filling stations.

So far as automobile service is concerned there is vast room for improvement.

Alabama

As a whole, one of the best prospects in the South. Cotton is grown throughout the State, but in the south especially, and its prospects in most sections are good.

Birmingham, in the center of a rich coal and iron field, is one of the leading manufacturing cities in the South and exceedingly prosperous. Its non-union coal fields have operated at top speed all through the strike.

The valley of the Tennessee River in the northern part of the State is good.

Huntsville and Decatur in the north are textile centers. The Merrimack Mfg. Co. of Lowell, Mass., has built the first unit of a huge cotton mill at Huntsville at a cost of \$1,000,000.

The district west of Montgomery, of which Selma is the center, is in the famous "black belt," which refers to the character of the soil and not the population, and is the richest farming section in the State.

Mississippi

The State as a whole will be one of the best bets in the South for motor vehicles if crops make good.

The Delta section, in which are Yazoo City and Jackson, raises the best long staple cotton in the South.

All the territory of which Memphis is the trading center, including Greenville, Greenwood, Clarksdale and Helena, Ark., raises cotton and offers good sales possibilities.

Kentucky

The entire State promises well but the tobacco sections will be best.

Arkansas

Prospects are better than they have been for some time but not especially bright. Little Rock is a good merchandising center.

Texas

The State ranks first in the production of cotton and good crops mean general prosperity in all the cotton sections. The west central part promises to be the best market in the entire South.

Sherman and Paris and the district down to Dallas is wonderful farm country and it also has oil.

The district south of Dallas, including Waco and Corsicana, is rich in farms and oil.

Burnet county, north of Austin, is a good prospect.

There is a new oil field in Orange county and all the old oil fields are good but not as good as they have been.

Houston is a good trading center.

The country south of San Antonio along the Rio Grande has been enriched by irrigation and is producing wonderful semi-tropical crops.

Louisiana

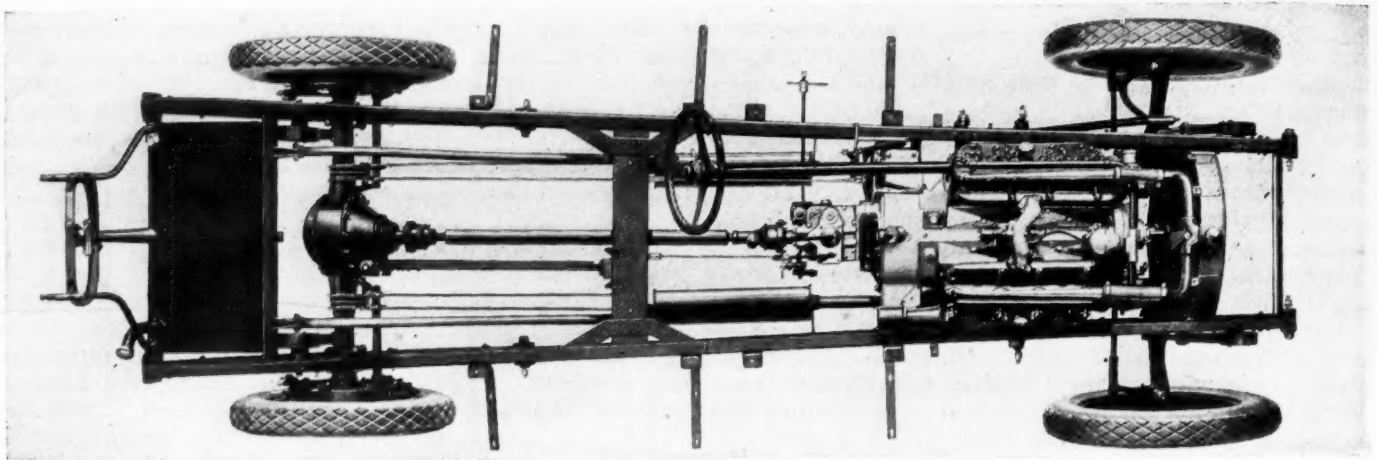
Conditions are more or less spotted but the rice and cane sections will be unusually prosperous. The cotton crop also promises well. Various towns are rapidly becoming industrial centers. New Orleans is very prosperous. The State as a whole is well worthy of study, there are many districts in which cars can be sold.

Virginia

Conditions in the State have improved greatly in the past year. Crops promise well and the State is developing rapidly in an industrial way. Richmond, Roanoke and Norfolk are good markets and all their factories are busy.

Oklahoma

The State ranks fourth in production of cotton. Conditions are somewhat spotted but sections with good cotton crops will be good.



Plan view of chassis showing new frame construction. The tubular cross members and straight side rails mark a departure from previous practice

1923 Peerless Carries Semi-Elliptic Springs

Platform spring suspension type abandoned in new models. Nearly every unit in car has been altered in some detail. Frame design more rigid and easier to produce. Wheels are smaller. Nine body types in line. Metal eliminated from closed car models.

By J. Edward Schipper

A NEW line of Peerless cars thoroughly refined mechanically and improved from the standpoint of appearance has been put on the market for 1923. The car is longer, having a 3-in. increase in wheelbase, and lower due to the redesigned straight line type of body, underslung springs and smaller wheels. There are nine types of bodies now offered on the 128 in. wheelbase, standard chassis.

The most striking difference from last year's models is the change to the semi-elliptic type of springs. The Peerless car has long been known for its use of the platform type of suspension and was one of the two makes of American cars which clung to this type of spring. This radical change in their suspension, together with a line of bodies of extremely modernized type, is of particular interest in view of the length of time that the platform spring and the rather high bodies have been Peerless ear marks.

Practically every unit from one end of the chassis to the other has been altered in some detail. While the engine has not been materially changed as far as the fundamental specifications are concerned, there are, nevertheless, a number of alterations of importance. By removing the tire pump from the front end of the engine, it has been possible to shorten the fan shaft, allowing the engine to be moved forward in the frame, thus giving a larger space in the front body compartment and greater accessibility to the steering gear and connections. A larger oil strainer screen has been installed as an independent unit in the

lower half of the crankcase. This screen can be removed for the purpose of cleaning without taking down the under half of the crankcase. An oil drain plug has been installed on the lower left side of the crankcase, this plug being removable for the purpose of draining oil with a special wrench furnished with the tool kit which obviates the necessity of getting under the car to drain the oil reservoir.

The front gearcase has been altered to suit the new method of front engine support, and because of the transfer of the tire pump from this point to the transmission gearcase. The front engine support has now been installed on the frame cross-member in a universal socket. Lubrication of this is obtained from an Alemite oiler. The water pump has been redesigned, the important features of the new pump being its larger capacity and the double bearings, one on each side of the rotor. This, in connection with a larger packing nut, increases the life of the pump and makes it more accessible in taking up wear. The capacity of the new Fedders honeycomb radiator is 7½ gal. In recent tests the temperature maintained was under 178 deg. while ascending the Uniontown hill. The radiator shell is of brass with several coats of nickel plate.

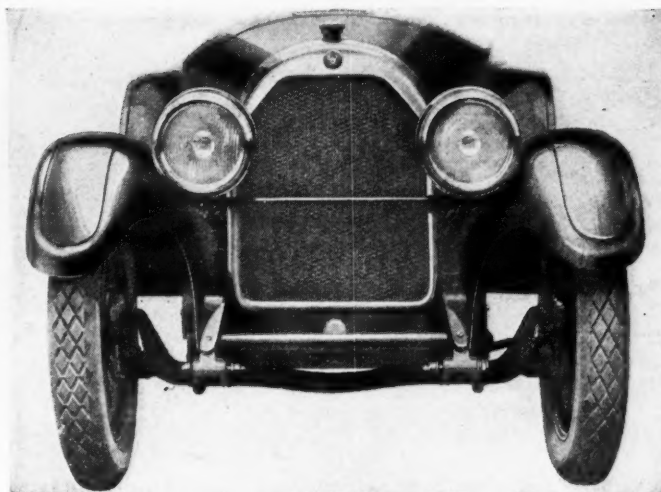
A slight alteration has been made in the exhaust line, the pipes now being carried down at the front end of the engine, instead of the rear, to permit of cleaner engine design, as well as to keep the heat from the front compartment of the car.

The former electrical units have been supplanted by the Delco system for starting, lighting and ignition. The distributor has been placed at the front end of the engine, now being bolted to the rear side of the timing gear housing and driven from the fan shaft gear. This location is more convenient when making adjustments. All wires have been placed in conduits. The distributor is an automatic type provided with a governor and equipped with double breaker contact points.

Practically no alterations have been made in the clutch, with the exception of a somewhat lower compression rate on the clutch spring to give a softer pedal action. Oilless bushings have been installed for the clutch release parts. To take care of the installation of the tire pump, the transmission gearcase has been altered. A hose connection has been provided at the left dust shield to facilitate the operations of the pump which is now started by inserting a screw driver in the slotted head that protrudes through the floorboard. A quarter-turn is sufficient to engage the pump gears. Another alteration in the gearset is due to the installation of a transmission lock immediately back of the shifting lever. A 250 key change has been supplied to comply with the standard of the National Insurance Association, thereby giving the owner the benefit of a reduced premium on his policy. Both the clutch and service brake pedals have been altered from adjustable to permanent to give a cleaner appearing front compartment. The gear shifter lever has also been redesigned to permit greater comfort in making speed changes, and the foot and emergency brake levers have been changed in regard to length and shape for the purpose of rendering less pressure necessary when applying the brakes.

Heavier construction is now used for the propeller shaft, this now embodying a tubular shaft equipped with Spicer universal joints protected by metal housings and lubricated by Alemite oiler. New type Timken axles both front and rear are employed, the front axle being drop forged from special alloy steel with integral yokes and spring perches. The steering knuckle is fitted with roller thrust bearings at the upper end, to promote ease in steering.

The rear axle now incorporates the straddle mounted pinion shaft in which there are two Timken bearings with the pinion gear in the center instead of the two bearings on one end and the gear in the outer position. The rear axle has been provided



The front end of the Peerless presents a very different appearance from previous models

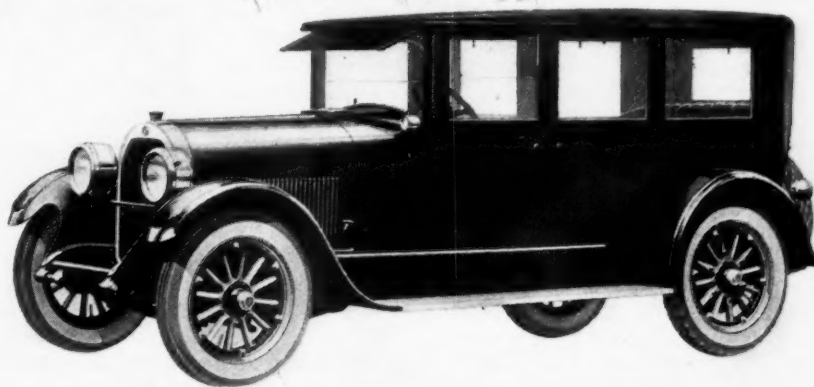
with a pressed steel torque arm having a fabric connection at the front end instead of the usual spring type of connection, thus eliminating any necessity for adjustment or any possibility of rattle at this point. The rear end is fastened to the rear axle housing by a pin encased in brass bushings, lubricated by the Alemite system. This same system is employed for lubrication of the axle shaft bearings and the spring shackles through tubes which are connected on each side of the rear axle near the brake drum. The brakes are 15½ in. in diameter and 2½ in. wide.

The internal brake is a new design having no adjustments other than the brake rod, which takes up wear on the lining.

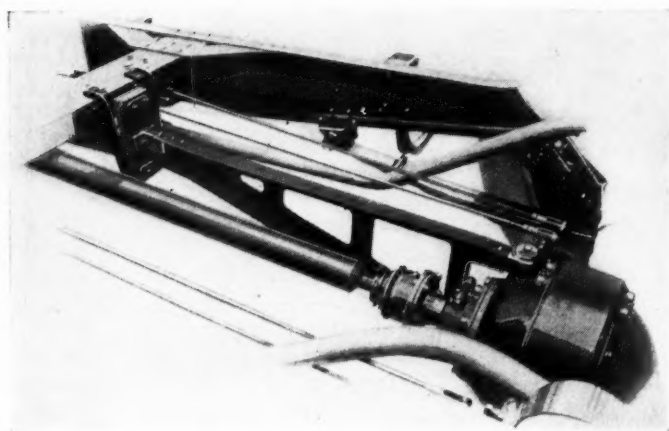
An entirely new design of frame is incorporated, this being more rigid and a better production job than the previous model. The side members are straight and have a maximum depth of 7½ in., thus eliminating truss rods to support the frame. Among the new features are tubular cross members, front and rear, pressed into the frame to take care of frame twist. In addition, there are also a radiator and engine front support cross member, a cross member which takes care of the brake rocker shaft and also the front end of the torque arm and a rear cross member for the front gasoline tank support. The new frame, due to the added cross members, is lighter, but stiffer than the previous design. The springs are carried directly underneath the side members and in this way eliminate the side member twist due to offset brackets, etc.

Smaller wheels are now used, the rims being 32 by 4½ in., permitting the use of 33 by 5 in. tires. The former size was 33 by 4½ front and 34 by 4½ rear. The wheels are of the Kelsey metal felloe type with twelve hickory spokes for both the front and rear wheels. The springs are semi-elliptical front and rear. The front springs are 41 in. long and 2¼ in. wide, containing nine leaves for all body types. The rear springs are 60 in. long and 2¼ in. wide, containing eight leaves for the lighter bodies and nine leaves for the heavier types. The spring shackles are heavy and adjustable to compensate for wear. The size of the spring bolts is ¾ in. and are designed for adjustment without the use of spacers or cotter pins for locking them when making the adjustment.

A Gemmer steering gear with 9½ to 1 ratio is used in these models. The steering gear is equipped with a solid walnut corrugated wheel 18 in. in



New five-passenger berlin limousine. No metal is used in the closed bodies of the Peerless line



(Left) Pressed steel torque arm. Note flexible coupling at front end of arm



(Right) Detail of new construction showing tubular cross members and Alemite lubricating system

diameter. The spark and throttle control levers are mounted on the upper portion just above the wheel proper. With the $9\frac{1}{2}$ to 1 ratio, a turning radius of 41 ft. to the right and 44 ft. to the left is provided.

The chassis equipment has been improved throughout. The battery is now an Exide, 6 volt, 120 amp. type carried in a special compartment on the right side of the frame, access being had by removal of the cover which is set flush with the dust shield. This new location is, of course, quite accessible. The horn is now a Kellogg, motor driven type, mounted on the right rear engine frame. It is operated by the convex shaped button located at the extreme upper terminal of the steering column. The head and cowl lamps are of Guide design and manufacture. The rear lamp provides a special combination tail light and stop signal. The stop signal switch is connected with the service brake pedal. The tail light also illuminates the dial on the gasoline tank and a trouble lamp of the reel type is mounted on the front face of the dash under the hood on the right-hand side. The tire carrier is now of the ring type and supported by the rear cross-member. It is designed to carry two extra tires, which are protected against theft by locks, the barrel of which is integral with the carrier.

Nine types of bodies are mounted on the standard 128 in. wheelbase. These include a four-passenger touring phaeton, seven-passenger touring phaeton, two-passenger roadster coupe, four-passenger Victoria coupe, four-passenger suburban coupe, five-passenger town sedan, seven-passenger suburban sedan, five-passenger berlin limousine, four-passenger opera brougham. All of these bodies are new, not only in appearance, but in construction. The open cars have several unique points of construction which may be mentioned.

Open Body Details

The four and seven-passenger phaeton are equipped with a permanent type of top constructed of steel tubing, with white ash strips, heavily padded and provided with the usual weatherproof top material. Although this is somewhat along the lines of the regular folding top, it presents an unbroken surface to the eye. At the rear the top is fashioned in the shape of the gypsy quarter curtain and a bevel plate glass window is provided. The rather solid construction of the top permits of good fitting for the curtains. These open with the doors and give an enclosed body which is substantially weather-proof.

The open bodies are equipped with a ventilator made integral with the top of the cowl and operated by a lever located just beneath the instrument board. The use of the ventilator makes possible a windshield of special design, the lower panel of which is unusually narrow in order that the intersection of the two glass panels will not come within the direct range of the driver's vision. The

lower panel is removable and the upper panel is adjustable in or out. The mounting on the instrument board incorporates all of the units in three symmetrical ovals, two of glass and one of metal. All of the smaller tools, such as are used for changing tires and making minor adjustments, are carried in a pocket in the left front door. If it is desired, the tools can be taken from the door as one unit, for they are fitted to a removable panel. The larger tools are carried under the front seat.

Additional equipment on these cars includes a rear vision mirror and a windshield wiper, hand operated. The four-passenger phaeton is equipped with a weather-proof trunk mounted on the rear. The open cars have the following optional paint colors: maroon, suburban blue, dust-proof grey. The body, hood and wheels are in colors and suitably striped to accentuate the lines of the body. The running gear and fenders are black. Special color combinations are available at additional cost.

Closed Cars Have Soft Top

The closed cars are all of the soft top variety, no metal being used in their construction, but in its place a covering of wood strips padded and finished with a glazed top material to eliminate the drumming noise. The upholstery used in the five-passenger sedan is a mohair velour offered in a variety of patterns. The coupe, limousine and brougham are upholstered in cloth. The ceilings and walls above the belt line are covered with materials that harmonize in texture and color with the upholstery. The carpets used in the closed car interiors are of wool and match the upholstery. The driving compartment of the limousine and the brougham is finished in bright enamel leather with corrugated linoleum on the floor. Dome lamps are standard equipment and the sedan, limousine and brougham carry corner lamps in addition. In place of the standard cowl lamp, the brougham is equipped with distinctive designed coach lamps on either side of the body just back of the driving compartment. The windshields differ from those furnished on the phaeton in that both the upper and lower glass panels are adjustable. A leather covered glass visor is fitted as standard equipment and the finishing colors are the same as those mentioned in connection with the open car.

SMALL Chinese firms have found it cheaper and more efficient to hire a truck than to employ the necessary number of coolies, says Consul General Edwin S. Cunningham, Shanghai, in a report to the Department of Commerce. A Shanghai newspaper has estimated that the expense of operating one truck for a day would be about \$31. To do the same amount of work sixty coolies would be required at a cost of from \$36 to \$48 for labor alone, exclusive of all other expenses.

New Vim Truck Redesigned Throughout

Four-cylinder, 4 x 5 in. engine gives maximum speed of 52 m.p.h. Capacity is 1000 to 1500 lbs. Thermo-siphon cooling employed. Electrical equipment is standard. Both service and emergency brakes are located on the rear wheels. Wheelbase is 108 in.

By Donald D. Blanchard

A NEW Vim truck, which bears no resemblance to the former model of that name, is now being produced by the Vim Motor Truck Co. of Philadelphia. The new model is a speed job and is conservatively rated at from 1000 to 1500 lb. capacity. It has ample power and shows unusual hill climbing ability.

The four-cylinder, L-head engine is a rugged, heavy duty design. The cylinder dimensions are 4 x 5 in., giving it a rated horsepower of 25.6. On the block, the engine shows an actual horsepower of almost 39 at 1600 r.p.m. The compression is 53 lb. The maximum speed of the truck is 52 miles per hour. The engine is run-in and given a dynamometer test at the factory.

The crankshaft is of vanadium steel and is balanced both statically and dynamically. It is carried in three main bearings all 2 in. in diameter. The front bearing is 3 3/16 in. long, the center bearing 3 1/4 in. long, and the rear bearing 3 5/16 in. long. The upper halves of the main bearings are bronze-backed. The connecting rod bearings are 2 in. in diameter and 2 1/4 in. long. The rods are drop forgings of I-beam section and are clamped to the piston pins, which are 1 3/8 in. in diameter. The piston pins work in removable bronze bushings in the pistons. The pistons have three rings, two above the pin and one below. These rings are 1/4 in. wide.

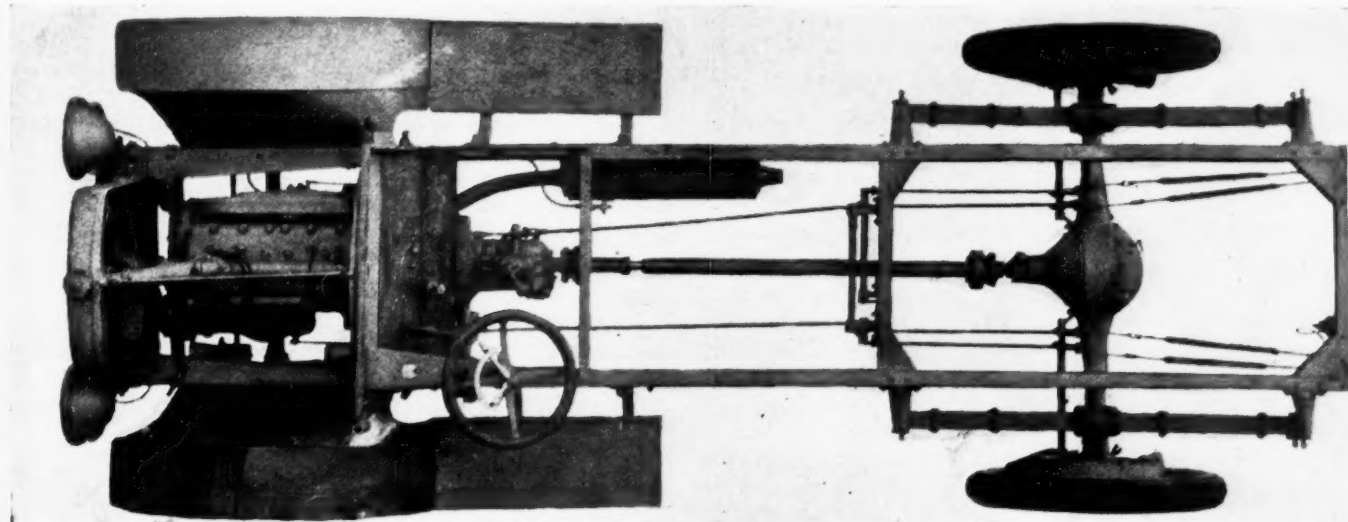
The valves and valve operating parts are located on the right side of the engine and are entirely enclosed. They are made readily accessible, however, by the removal of two

cover plates, each of which is held in position by a single stud bolt. There are four spiral timing gears. The right hand gear drives the camshaft and the one on the left drives the combination generator and distributor through a coupling.

Oil is supplied to the main and connecting rod bearings under pressure. The oil pump is driven through spiral gears from the rear end of the camshaft. The pump is located at the extreme rear of the sump and at the lowest point. Consequently it is supplied with oil under all conditions. Oil draining back into the crankcase is filtered before entering the pump. The pump is of the gear type and develops about 10 lb. pressure at 1000 r.p.m. of the engine. An oil pressure gage is located on the dash and there is a bayonet type of oil gage for measuring the quantity of oil in the crankcase.

FUEL is fed to the 1-in. Zenith carburetor by gravity from the tank under the seat. The intake and exhaust manifolds are cast integrally, a hot spot being provided to heat the mixture. Air entering the carburetor is pre-heated by passing through a stove on the exhaust pipe. Due to the fact that the carburetor and manifolds are on one side and the ignition system on the other side of the engine, the powerplant has an unusually clean appearance and is very accessible.

Cooling water is circulated by thermo-siphon. The radiator is of the tubular fin type. The radiator core is



Plan view of new Vim truck chassis. The engine is supported at the front by a forged steel cross member. The steering column support carries ammeter and lighting and ignition switch

carried in a pressed steel shell which is spring supported on the frame. The outlet and inlet connections on both the radiator and engine are removable so it is not necessary to touch the hose clamps to break the connections at any of these points. The fan is driven from a pulley mounted on an extension of the shaft which drives the generator. The fanshaft may be adjusted vertically to take up slack in the fan belt. The capacity of the cooling system is $7\frac{1}{2}$ gallons.

ELECTRIC starting, lighting and ignition are regular equipment. The starting motor and combined generator and ignition unit are Westinghouse and the battery is a Willard. The system is a 6-volt, ground return type. The generator is mounted on a bracket on the left side of the engine. The starting motor, which has a screw shift is located on the right side underneath the air intake pipe leading to the carburetor. The lighting and ignition switch and the ammeter are mounted on the steering column support. Single contact bulbs of the following sizes are used: headlights 18 cp., and tail-light 2 cp. The diameter of the headlight lens is 9 in.

The clutch and gearset are a unit with the engine. The clutch is a multiple dry disk type with five driving and five driven disks. A clutch brake is provided. The disks are faced with asbestos, 8 in. outside diameter, 6 in. inside diameter and $\frac{1}{8}$ in. thick. The gearset provides three speeds forward and one reverse. The ratios are 3.24 to 1 in low, 1.66 to 1 in second, 1 to 1 in high and 4.16 to 1 in reverse. The mainshaft in the gearset is mounted in ball bearings and the countershaft in plain bearings. A power take-off is provided for tire pump only.

The propellershaft has two metal universal joints of the self-lubricating type. The rear axle is semi-floating and has a road clearance of $9\frac{1}{2}$ in. Spiral bevel reduction gears are used, the ratio being 4.7 to 1. Torque and propulsion are taken through the springs. The sleeves surrounding the pressed steel axle housing and carrying the spring chairs extend far enough toward the center of the axle so that the rubber bumpers on the bottom of the frame side members strike them and not the axle housing. The differential ring and pinion are mounted as a unit so that the complete carrier may be removed from the housing without disturbing the adjustment. The pinion shaft is supported by two roller bearings, both forward of the pinion.

THE side members of the frame are pressed steel channels 5 in. deep with $1\frac{3}{4}$ in. flanges. The frame is braced laterally at five points. The front cross member is in front of the radiator and protects it in case of collision. The second cross member is a steel forging which serves as the front engine support. The flywheel housing acts as the third cross member. Brackets are riveted to the frame to which the front engine support and the supports on the flywheel housing are bolted. The fourth cross member is at the point where the front hangers for the rear springs are attached, and the fifth connects the rear ends of the side members.

The springs are semi-elliptic front and rear. The front

springs are 2 in. wide and 38 in. long, and have nine leaves with two rebound plates. The rear springs are $2\frac{1}{4} \times 50\frac{1}{2}$ in. and have ten leaves with three rebound plates. The spring bolts are applied to the hangers by means of clamping bolts which eliminate the possibility of their working loose. Spring bolts are hardened and ground, and are oil lubricated.

Both service and emergency brakes are located on the rear wheels. The brake lining dimensions are as follows: external service brake—length 48 in., width $2\frac{1}{2}$ in., thickness $\frac{5}{32}$ in.; internal emergency brake—length $46\frac{5}{8}$ in., width $2\frac{1}{4}$ in., thickness $\frac{5}{32}$ in. Springs are provided in the brake operating mechanism to take up wear in clevis and shafts and to eliminate rattles automatically.

The steering gear is a worm and wheel type. The steering wheel is 18 in. in diameter. Hand spark and throttle controls, and horn button are located on top of the steering column. The carburetor choke is also located on the steering column. The turning radius of the truck is 19 ft. The wheelbase is 108 in. Wood wheels with 32 x 4 in. cord tires on Firestone rims are regular equipment.

The length from the back of the driver's seat to the end of the frame is $76\frac{1}{2}$ in., and to the center of the rear axle $44\frac{1}{4}$ in. The maximum allowable body overhang is 10 in. and the maximum body width between rear wheels is $46\frac{3}{4}$ in. The driver's seat is $44\frac{1}{2}$ in. wide. The extreme width of the frame is 30 in. and the distance from the ground to the top of the frame, assuming the truck is fully loaded, is $27\frac{1}{4}$ in.

The dash is built of one main plate of 11 gage sheet steel to which the floor

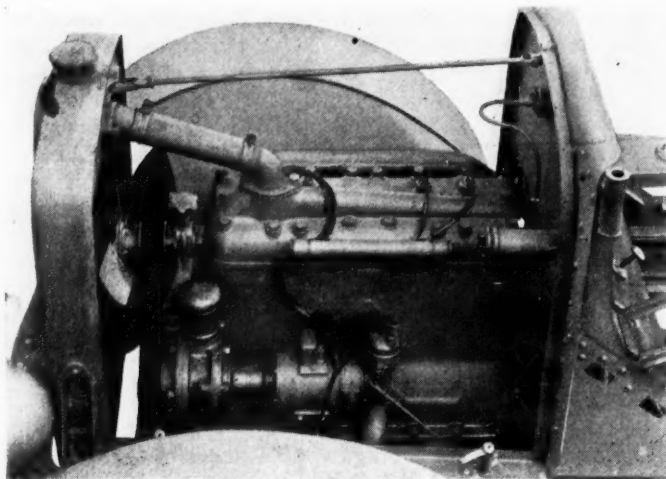
board supports are hot riveted. Chassis equipment includes electric headlights with approved lenses, tail light, motor driven horn, complete set of tools, front fenders, gasoline tank, runningboards, jack and pump.

THE open express body is ruggedly constructed. The up-rights are made of ash and the steel sides are bolted to them. The tailgate is 12 in. high and is supported by covered chains. The seat is comfortably upholstered. The inside loading dimensions are: length $85\frac{1}{2}$ in., width at floor $44\frac{1}{2}$ in. and height $55\frac{1}{4}$ in. This body is painted dark olive green with natural wood wheels and black trim.

The panel body is intended for general merchandise delivery. The frame of this body is ash reinforced with steel. The wood floor is provided with metal skids. The rear doors have glass windows. The body is painted a dark olive green with black trim and natural wood wheels. The inside loading dimensions are the same as for the express body.

The Vim Co. is now controlled by an entirely new organization. The new truck is being produced at a new plant located in the Nicetown section of Philadelphia. The units entering into the construction of the truck are for the most part manufactured elsewhere, but they are in most cases produced exclusively for use in this model.

The price list on the chassis is \$995. Fitted with the open express body, the price is \$1,185 and with panel body, \$1,210. Front fenders and runningboards are furnished with the chassis, but the driver's seat is not included.



View of engine showing generator mounting

Modern German Car Chassis Have Unique Details

Fan and water pump impeller on opposite ends of same shaft in some cases. Special facilities for ready adjustment of brakes on the new Benz six. Mercedes has rigid central frame cross-member. Unconventional rear springs used to improve riding qualities.

By Benno R. Dierfeld

CLOSE examination of present-day German passenger cars reveals a number of interesting details which are worthy of note by American designers. Several of these details are described in the following pages.

It is a well known fact that in the usual layout of fan and radiator, the fan is effective only over the central portion of the core, especially when the radiator is of pointed type. In some German cars using pointed radiators it is customary to provide a cowling of sheet metal between the radiator and fan, the latter operating in the outlet of the casing. The construction used on the Ehrhardt car is shown in Fig. 1. This is said to give uniform air flow through all the radiating surface.

On N.A.G. cars the fan bracket of aluminum is fitted with an eccentric bearing arranged to facilitate tightening the fan belt. The construction employed is shown in Fig. 2. To adjust the belt the four nuts through the flange which supports the fan bracket are loosened and the whole bracket is turned around in a recess cast in the water jacket of the forward engine cylinder. When thus tightened the clamping flange bolts are again set up. In this case the shaft on which the fan is mounted carries on its inner end a pump impeller which turns in the water jacket and assists in causing the water to circulate.

The water pump arrangement on the new Benz six-cylinder car is shown in Fig. 3. In this case the pump is driven directly off the timing gears and is in tandem with the magneto, which is driven from the rear end of the pump shaft. The left hand end of the T-fitting just back of the pump is connected to the radiator, while the other end, connected to the pump discharge, conveys water to the cylinder jacket. A short vertical shaft ending in a wing nut serves to operate a drain cock in the base of the pump.

WHEN the water jacket of the engine is at a considerable distance from the radiator a rather long connecting hose is required, and this has a tendency to make the external appearance of the engine less sightly than it would otherwise be. To avoid this drawback the water inlet pipe on the N.A.G. car is cast integrally with the timing gear case cover as shown in Fig. 4.

Fig. 5 shows the arrangement of the oil filler cap and oil level gage. These two are placed close together to enable the person who is putting oil into the engine to readily determine when the desired oil level is reached. The cover for the filler opening is hinged and provided with a

spring which tends to hold it shut, thus avoiding the use of a screw cap.

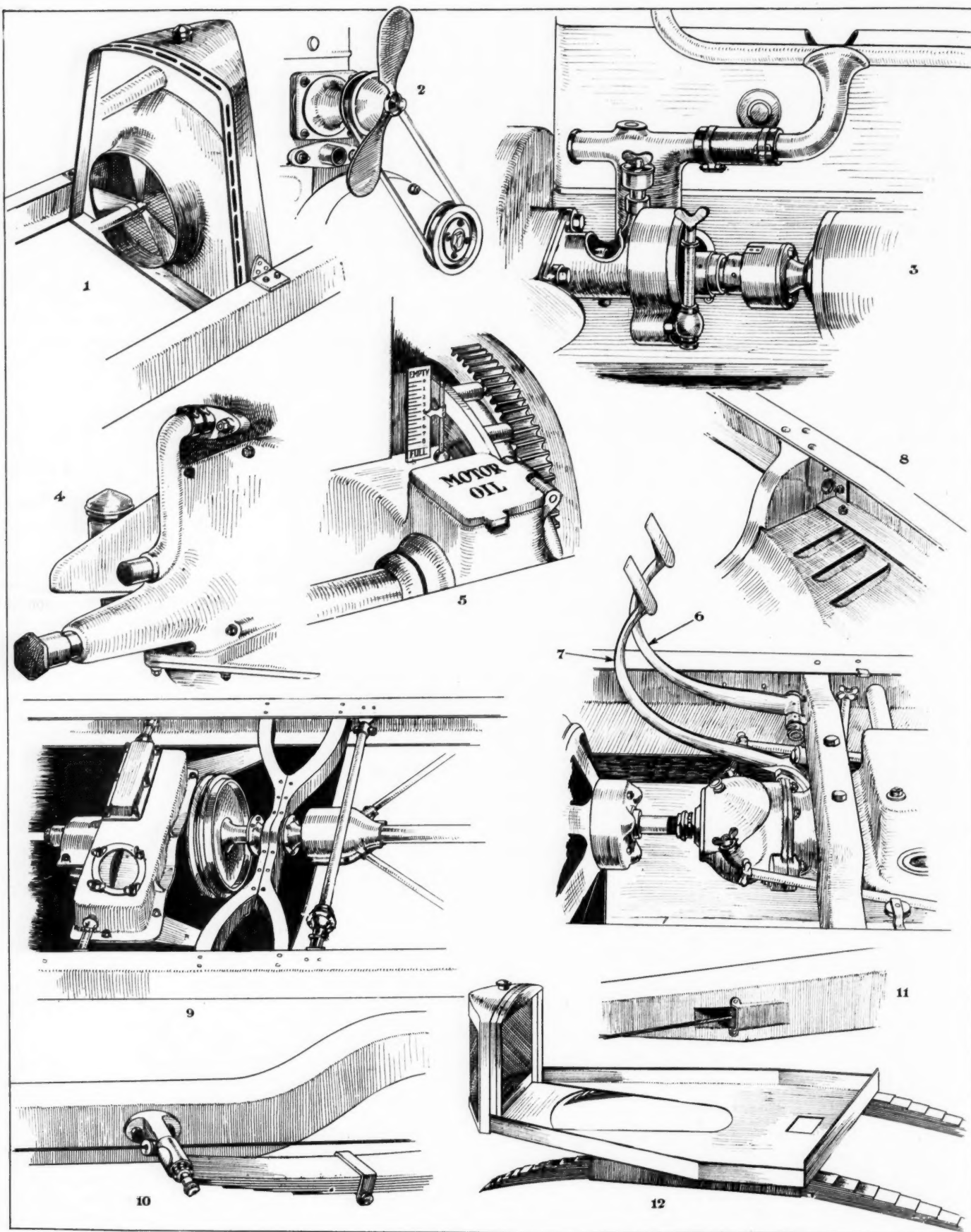
In German cars it is quite usual to carry the clutch pedal, brake pedal and hand brake lever on a common shaft supported between the two side members of the frame, but in the new Benz six-cylinder car the clutch pedal is supported from an aluminum case which encloses the clutch brake. This clutch brake casing is supported on the front end of the gearset and is provided with a cover which can be easily removed by loosening two wing nuts, as can be seen from Fig. 6. The two rods with cross handles projecting under the frame member on each side of the gearset are provided to facilitate adjustment of the wheel brakes, an adjustment usually effected at the wheels. This arrangement is said to be more readily accessible and cleaner than an adjusting device located in conventional manner.

FIG. 7 shows the brake pedal arrangement on the same Benz car. The pivot for the pedal is only a short shaft with bearings attached directly to the frame cross members. Directly behind this cross member can be seen the cross handle arranged in an accessible position for adjustment of the transmission brake. This layout of brake and clutch pedals is said to be lighter and much more easily dismantled than one in which a common cross shaft is employed.

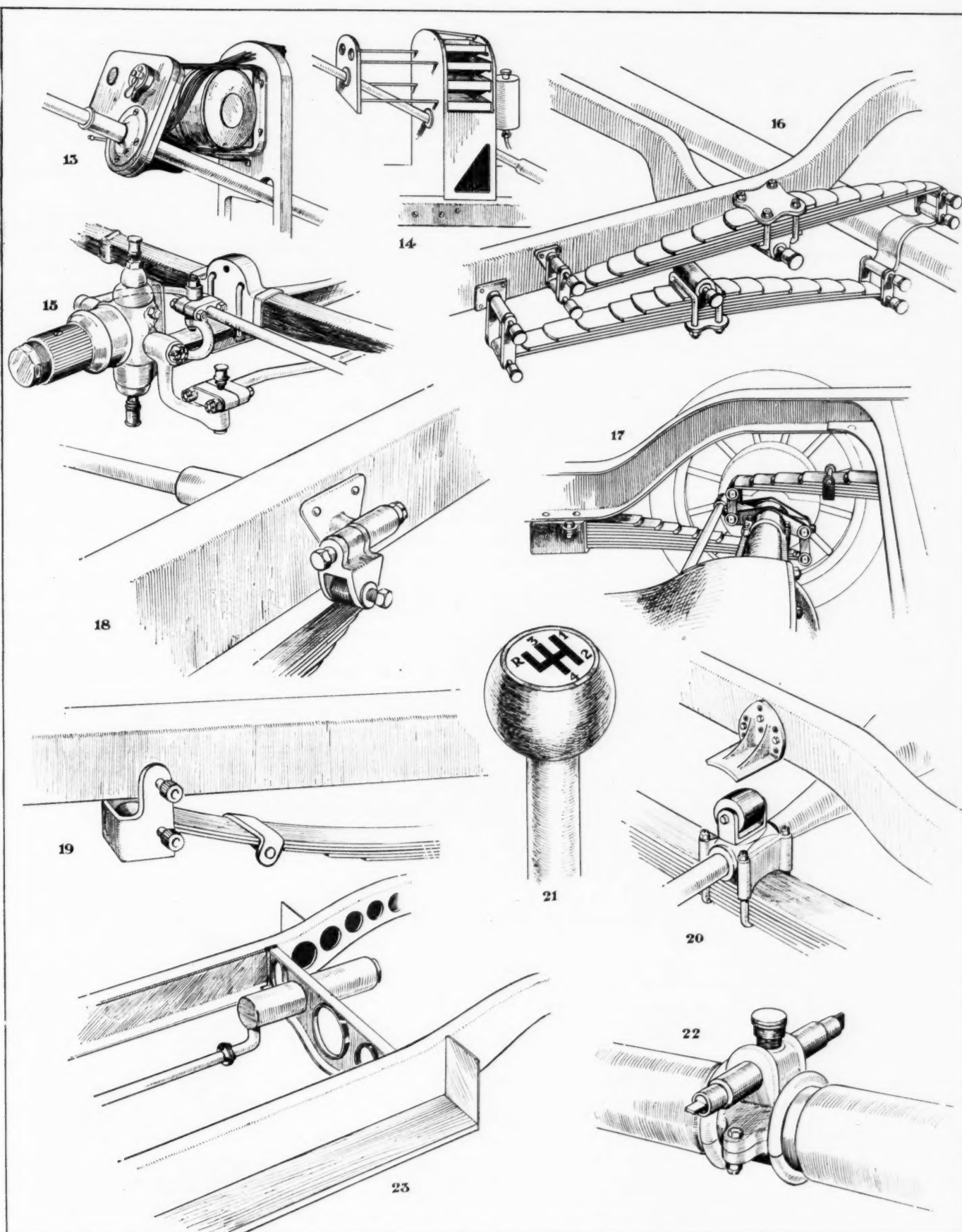
In Audi cars the arrangement shown in Fig. 8 is used to prevent the space under the floorboard from becoming dirty. It will be noted that the under pan of the engine is extended to the central cross member of the frame which supports the rear end of the gearset. This under pan has louvres on both sides of the gearset opening to the rear, thus facilitating ventilation of the engine compartment.

In Mercedes cars the design of the central cross members of the frame is quite different from the conventional as will be seen by reference to Fig. 9. The cross member in question is made up from two channels bent into the shape of a double Y. This member is arranged to take the thrust and torque imposed upon the tubular member which encloses the propeller shaft.

A number of German cars employ cables for operating the wheel brakes. Guides for the cable are provided in some cases, that used on the Aga small car being shown in Fig. 10. In this case the guide is combined with the bracket for the front end of the rear spring and contains



1—Fan cowling used on Ehrhardt car. 2—Combined fan and water pump with eccentric adjustment used on N. A. G. cars. 3—Pump layout on new Benz six. 4—Water inlet pipe on the N. A. G. is cast integrally with timing gear case cover. 5—Oil filler and oil level gage on Dux car. 6—Clutch pedal arrangement and brake adjusting rods on Benz six. 7—Brake pedal and brake transmission adjustment on Benz six. 8—Underpan on Audi car is extended to central frame cross member. 9—Rigid central cross member used in the Mercedes chassis. 10—Combined brake table guide and spring bracket used on Aga small car. 11—Brush wire cable guide on Maybach car. 12—Frame and spring arrangement on the light N. U. G. two seater chassis



13—Oil tank mounting on Mercedes chassis. 14—Drawers for tools, etc., in double dash of the Steiger car. 15—Double steering knuckle arms on Audi chassis. 16—Double rear spring arrangement on Fulmina car. 17—Double quarter elliptic springs used on rear end of Horch chassis. 18—Spring bracket with swivel joint on N. S. U. chassis. 19—Spring shackle of pressed metal used on Brennabor car. 20—Adjustable bumper striker on Hansa-Lloyd. 21—Gear shifter knob with gate marking used on Hansa-Lloyd. 22—Speedometer drive on Hansa-Lloyd. 23—Method of supporting muffer on Maybach chassis

a graphited bushing of special metal. In the case of the Maybach car the cable is guided in a soft wire brush arranged in a slot cut in the curved frame side member. This brush is said to remove rust and dirt which accumulates on the cable. See Fig. 11.

IN the case of light cars the frame and spring arrangement present difficult problems. These are met in the case of the N.U.G. chassis designed for carrying two persons by use of the construction shown in Fig. 12. The frame consists of two side members of channel section connected by a floor sheet about $\frac{1}{8}$ in. thick. The front and rear quarter-elliptic springs are fitted into the ends of the side members as shown. The floor sheet is cut away to accommodate engine and gearset, and forms the foundation of the light two seater body. This design is said to be cheap and light and to meet all requirements of the light car user.

The space between dash and instrument board in the Mercedes chassis is utilized for an oil tank containing fresh lubricant for the engine, as shown in Fig. 13. A double dash, illustrated in Fig. 14, is used in the Steiger car. Into this space are fitted drawers of different sizes which are convenient for carrying tools, etc. These are made accessible by lifting a portion of the cowl.

Inasmuch as breakage which sometimes occurs in the arms of the steering knuckle is apt to result in serious accident, special precautions are taken by the designers of the Audi chassis in which two steering knuckle arms are provided as shown in Fig. 15. Breakage of one of these arms can occur without affecting steering of the car.

Variations in the design of rear springs are becoming more common. One of these, shown in Fig. 16, is used on the Fulmina car. In this case two half elliptic springs are employed, one above the other, but slightly offset, as shown in the sketch. This construction is said to result in unusually good riding qualities. Breakage of one of the two springs can occur without putting the car entirely out of commission. In the Horch car the spring design shown in Fig. 17 is used. This consists of two quarter elliptic springs of different lengths fastened respectively to the side member and rear cross member. The thin ends of the spring are connected by shackles to a balance beam

arranged to turn freely on a bronze sleeve fitting over the axle tube. This construction decreases unsprung weight and is said to result in good riding qualities. The N.S.U. car is provided with rear spring brackets intended to relieve the spring from twisting strains. There are two spring bolts arranged at right angles as shown in Fig. 18. Torsional deflections of the frame are not communicated to the spring in this case on account of the fact that the spring is free to move about a fore and aft axis. This arrangement is said to increase the life of the spring as well as to improve riding qualities.

A strong and light spring shackle is employed in the Brennabor car. It is made from a single piece stamped from heavy sheet stock, as will be noted from Fig. 19. This shackle is easily manufactured and its construction is such that it tends to protect the spring bolt against entrance of grit. The striker for the rubber bumper on the Hansa-Lloyd car is provided with three sets of holes which enable it to be bolted in three different positions and thus accommodate different weights of body or load. See Fig. 20.

Ball and socket gearshift levers are rather rare in German cars, one reason for this being that most cars have four forward speeds so that gearshifting without a gate involves some difficulties. To offset this disadvantage the Hansa-Lloyd gearshift lever handle is provided with an ivory plate inserted on its upper surface, which explains by the use of black lines, laid out in the form of a gate, and numbers the motion required in shifting the different gears. See Fig. 21.

THE type of speedometer drive employed on the Hansa-Lloyd is shown in Fig. 22. On the front end of the universal shaft there is mounted a worm wheel. The mating worm situated above is arranged to drive the flexible shaft of the speedometer. Either end of the worm shaft can be used for this purpose.

In the Maybach car the muffler is securely supported from a wide cross member which has a circular opening through which the muffler is inserted, Fig. 23. The muffler is provided with a flange which bolts to the cross member, this rigid mounting being such as to prevent rattles which often occur with less secure mountings.

Lomar Shock Absorber

A NEW shock absorber of the supplementary spring type is being manufactured by the Lomar Mfg. Co. It consists of a steel cylinder closed at both ends, in which are located two coiled springs of alloy steel, the free ends of which are located inside cupped plungers, and between the two plungers there is a cam-ended lever arm.

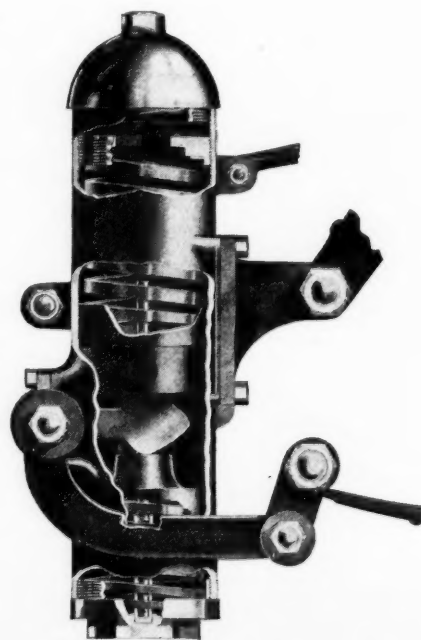
From the eye of the spring, connection is made through the usual shackles to a pair of lever arms mounted on the same shaft as the lever arm inside the cylinder. The upper of the two springs in the cylinder cushions the shock received by the axle and the lower spring cushions the rebound.

Both coiled springs can be adjusted as to pressure by means of nuts in the ends of the cylinder. The cam above referred to acts on the upper plunger through a roller, so as to reduce friction and wear.

One-half pint of heavy oil poured into the cylinder is pumped to the top of the device and flows back by gravity, lubricating all working parts.

The standard finish of the shock absorber is black enamel with nickel trimmings.

*L o m a r s u p p l e -
m e n t a r y s p r i n g
t y p e s h o c k a b -
s o r b e r*



Fundamental Data for Use in Hot Spot Design

Experimental tests on six-cylinder car, weighing 3200 lbs. give valuable results. Data are not conclusive, but comprise new material of definite interest. Commercial application considered.

By C. S. Kegerreis

THE term "Hot Spot" is commonly applied to all forms of devices where the mixture is heated by means of the exhaust gases. Usually the entire mixture of fuel and air is so treated, and in many instances where this method is used an appreciable power loss is apparent. It is felt the ideal "hot spot" only heats and vaporizes the fuel after metering and on admixture with the air a fog mixture is effected.

One of the main purposes of a hot spot is to effect proper distribution of the charge. Dependent upon this factor is the state of the mixture at start of distribution. An immense amount of time and effort has been expended in designing manifolds for distribution of wet mixtures. Few have been successful. Tests have proven that with correct vaporization many distribution troubles were non-existent. Many designs result in excellent vaporization, but the point of application of the heat is wrong. Thus, proper vaporization must immediately follow the metering, and if these two factors are correct, then distribution is exceptionally simple.

To be commercially practicable any hot spot manifold must embody the following points:

1. Minimum temperatures to allow high power.
2. Effect distribution of foggy or dry mixtures of equal quantity and quality to each cylinder.
3. Allow instant acceleration without hot spot flooding.

If these requirements are fulfilled the fuel must be vaporized away from the air stream or else exceptionally fine atomization must be employed. This development deals with the type where all the fuel is vaporized away from the air stream and allowing for no atomization. If the atomization factor is desired, the final results can be applied by evaluating the fineness of the fuel particles in any case.

The data in the presentation is used only as a basis on

¹ Annual meeting paper, March Journal S. A. E., 1922. By O. C. Berry and C. S. Kegerreis.

which to show the method of computation and in all cases it is the result of tests gathered from various sources. No attempt is made to consider any but the main fundamentals and to show that it is possible to eliminate some experimental development.

The author wishes to express his appreciation to H. H. McCarty and W. B. Sanders, graduate students, for their assistance in assembling the data and making the computations of the results plotted in the graphs.

The engine and car used as a basis for the design is a composite of several. The vaporization data presented is taken from "Manifold Vaporization and Exhaust Gas Temperatures" (S.A.E. Paper). Other empirical results are derived from various tests wherever available.

The specifications of the composite engine and car is as follows:

Six-cylinder engine— $3\frac{1}{4}$ " bore, $4\frac{1}{2}$ " stroke.
Piston displacement—211.6 cubic inches.
Weight of car—3200 pounds.
Gear ratio—4.5 to 1.
33" wheels.

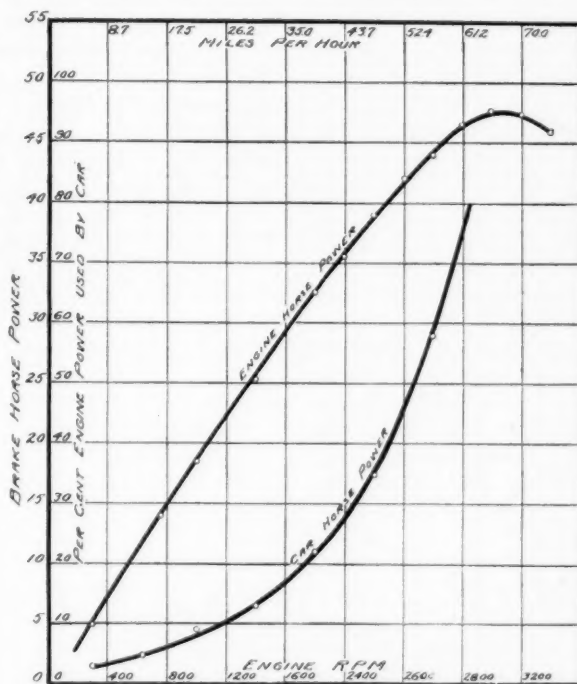


Fig. 1—Engine and car brake horsepower

The performance which can be expected from this car is shown in Fig. 1. The values are approximate for operation on a paved level road. Information such as the thermal and volumetric efficiencies are necessary in connection with Fig. 1, to compute the fuel flow rate under the various operating speeds and loads. This data is presented in plot form in Figs. 2 and 3. It is true that the thermal efficiency varies with respect to speed at constant load, but for the purpose in view data is presented of a commercial engine at only one speed. We now have sufficient data for evaluating the fuel flow under any operating speed and load of the car or engine. The car data is presented in terms of engine r.p.m. Fig. 4 shows this relation for three engine conditions, low (0.1 load brake) half and full loads and also for car operation on a level road.

It is now found that there are three main factors which determine the hot spot area. They are heat, rate of fuel

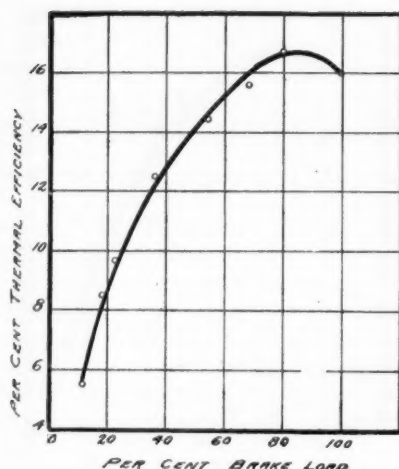
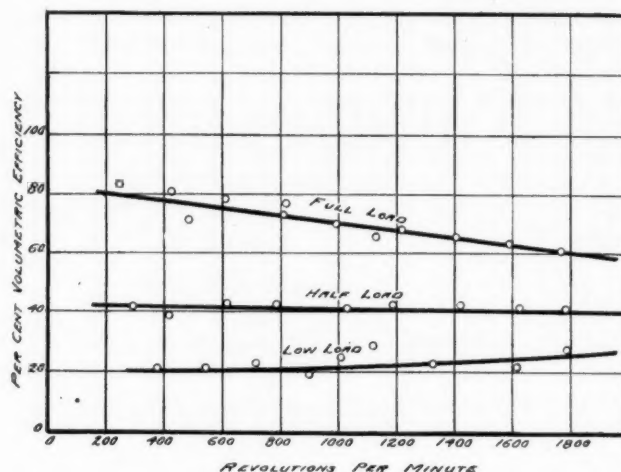


Fig. 2 (left) — Brake thermal efficiency at mixture ratio of .0800 pounds gasoline per lb. dry air (1000 r.p.m.)

Fig. 3 (right) — Volumetric efficiency of six-cylinder engine



vaporization and flow rate of fuel. The source of heat utilized is, of course, that of the exhaust. As the speed and load of the engine is changed, not only the amount of heat rejected in the exhaust, but the temperature of the exhaust is changed. Results from investigations at Purdue show that there is a definite relationship between this temperature and the fuel flow rate to the engine, considering a constant mixture ratio fed to the engine. Developing and recomputing this data for the sample engine this relation is presented graphically in Fig. 5.

In the original tests the curve was derived by plotting the results from tests at all conditions of speed and load operation with a constant ignition timing and mixture ratio. This data available, the results can be applied with a fair degree of accuracy to any ordinary powerplant. This has been done in Fig. 6, and the four points considered are shown. The question of heat being ample for the vaporization of the fuel is more difficult to evaluate and requires very complete tests. Several authorities agree that the supply is sufficient for designs of small utilization. That being the case, the larger engines would also provide an ample amount as the increased efficiency and design factors should not cause such a large change.

If the heat rejected to the exhaust is sufficient, and the temperature of the exhaust gases being a function of the fuel flow rate in throttling engines, some of the com-

plexities vanish, leaving only one other variable—the rate of fuel vaporization. Distillation data does not suffice when applied to hot spot design. Distillation information tells us the relative volatility of any fuel and what temperatures are necessary for evaporation to dryness, yet it is the rate of vaporization per unit area with which a hot spot is concerned. The Station determined these rates for several fuels, the gist of which was published in the aforementioned² S.A.E. paper. The results for ordinary commercial gasoline of 56.5 Be' is redrawn in Fig. 7.

A small difference at the lower temperatures causes a big change in the vaporization rate per square inch. At the maximum rates noted (about 500 deg. Fahr.) solid material was deposited showing that there are temperatures that are undesirable for hot spot use. Temperatures above this or in the spheroidal state are entirely free from this deposition. To more closely compare the results in Fig. 7, with the usual method, the distillation data follows:

Initial boiling point	96° F.
10	162
20	210
30	247
40	272
50	295
60	313
70	335
80	356
90	381
Max.	425

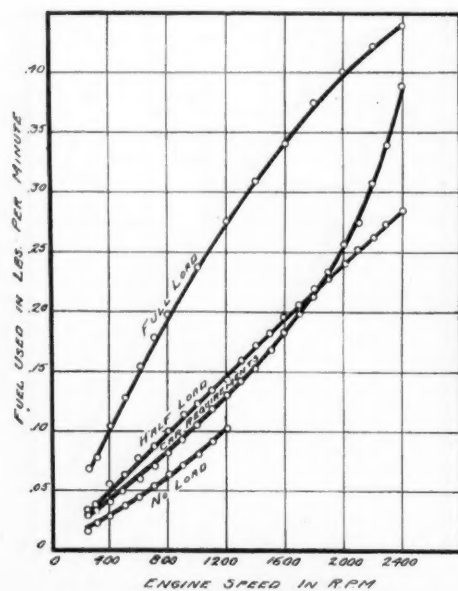


Fig. 4—Fuel consumption using 56 Be' gasoline with mixture ratio of .0800 lbs. gasoline per lb. dry air

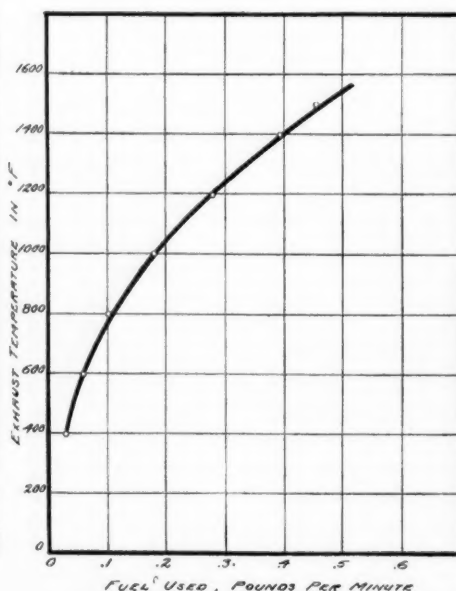


Fig. 5—Relation between exhaust gas temperature and fuel flow rate

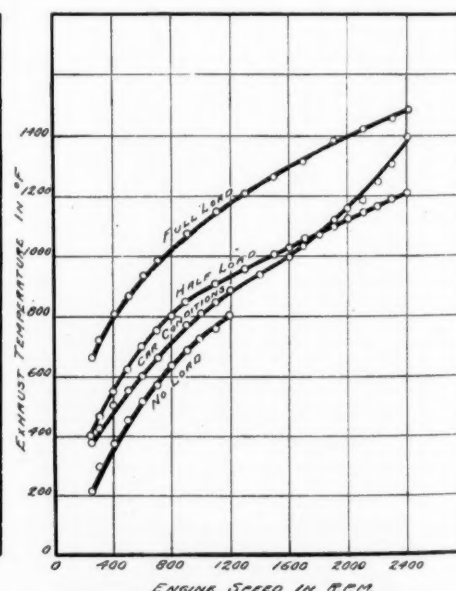


Fig. 6—Exhaust gas temperature at various conditions

² Reprinted in AUTOMOTIVE INDUSTRIES, June 8, 1922.

The values of the rates of vaporization are reported at atmospheric pressure which would nearly conform to an engine operating at full load or accelerating rapidly. Under other conditions where the absolute pressure in the manifold is less, the vaporization would be higher. As an engine is continually accelerating or decelerating the manifold pressure is quite a variable, and as atmospheric pressure is approached as a limit this is the worst condition to be met. If the heated area is computed at atmospheric pressure any added vaporization the manifold may allow is a help, and in the type under discussion no overheating will develop.

If the three primary factors essential to determine the hot spot area are evaluated, the relation is simply expressed by the equation

$$A = \frac{F}{R}$$

Where

- A is the hot spot area;
F, the fuel flow per unit of time;
R, the rate of vaporization per unit area.

THE temperature of the exhaust gases being a variable and the rate of fuel vaporization depending on it, no definite area will suffice for all loads and speeds. For the power plant used, Fig. 8, shows the four points of operation previously explained. The hot spot area presupposes all the fuel vaporized by the hot spot and under actual exhaust temperatures. The curve for car operation is interesting, as the maximum area is not necessary for even prolonged idling in high gear. Of course, where low speed idling at no load is noted, the required area mounts rapidly.

In a practical example, where the manifold depression and the carbureter atomization are considered, foggy or even dry mixtures have been attained with a minimum area.

In any case it is not the low loads and the low speeds that cause trouble with hot spots, but more generally the acceleration after a period of idling. To be theoretically correct, the heated area should be changed with every variation of load or speed but for average operation this

is folly. Even with poor carbureter atomization, 15 sq. in. of heated area should be amply sufficient for any condition that may arise during summer or winter operation.

When the art of carburetion is seriously considered as embracing the manifold system as well as the metering device, and these made to operate in harmony with the whole powerplant, each part so designed as to properly function, little apprehension of the heavier fuels looming in the future need be felt. When the fuels properly vaporized will travel 10 to 15 ft. in 10 deg. Fahr. air without condensing beyond the fog point it would seem sane to conceive that with suitable atomization for starting and correct application of heat satisfactory operation could be obtained throughout the year.

The data presented in this article is not final nor exceptionally conclusive, but it may prove of value in bringing to light some helpful points on hot spots and to show how badly research is needed to eliminate excessive experimental efforts.

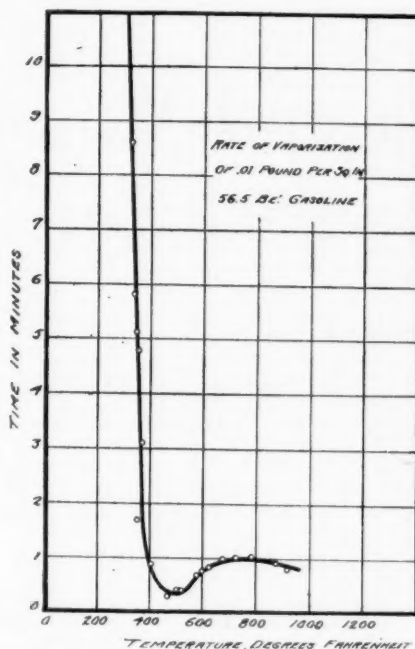


Fig. 7—Vaporization data of commercial gasoline

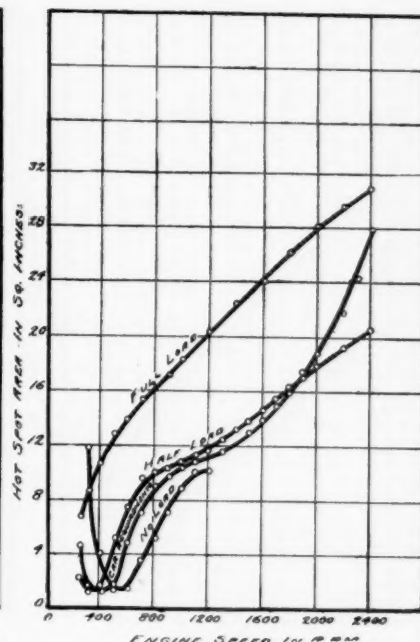
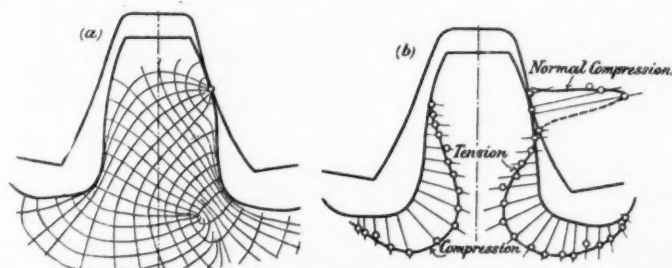


Fig. 8—Theoretical hot spot areas at atmospheric pressure

Stress Distribution in Gear Teeth

PROF. E. G. COKER of England years ago developed a method of determining the distribution of stresses in power-transmitting members by means of celluloid mod-



(a) Lines of principal stress in a tooth of a spur wheel. (b) Contour stress in the same tooth

els and polarized light, and he has since applied this method to the analysis of stresses in many common machine parts.

In a paper which he read before the Institution of Mechanical Engineers at Paris recently he gave stress diagrams for spur gear teeth. A typical example of this kind is shown in the illustration herewith, in which the upper part of the diagram shows the lines of principal stress in a tooth, and the lower part the contour stresses with maximum values at the roots and at the surfaces in contact.

The stress distribution is obviously of a complicated character and it is apparent that the usual method of calculating the stresses in teeth by considering them as cantilevers can be only a very rough approximation. Of course the stress in the tooth varies as the line of contact shifts along the flank.

Will Truck and Motor Bus Design Change Radically in the Future?

British expert believes future changes will be minor in character. Two-wheel drive likely to continue in predominance. Lighter weight seems probable. Improved accessibility is desirable.

By Sir John E. Thornycroft*

IN addition to the limitations which may be imposed legally, resulting from taxation, limiting weight, speed, etc., the designer and builder may be limited by the impossibility of a particular fuel being available at economical prices. We are told that we only get supplies of American petrol in this country because we pay a higher price for it than they do in America. It seems doubtful if anyone really knows how long the supplies of petrol are going to meet the constantly increasing demands brought about by the ever-increasing number of motor vehicles. There can be no doubt that some form of petroleum spirit is by far the most convenient fuel. An average motor can be made to run reasonably well on kerosene by fitting a vaporizer, but it is necessarily less flexible and more trouble to drive.

In parts of the world where kerosene is materially cheaper than petrol, there are a fair number of vehicles using it, but it cannot be said there has been any general adoption, and there seems little doubt that, if petrol can be obtained at anything like a reasonable price, users will not put up with the extra trouble which a somewhat cheaper fuel entails. Where cheap alcohol is available, by increasing the compression of the motors they can be run on it quite well and, in the event of a world shortage of petroleum spirit, this must be looked upon as one of the best substitutes. Unfortunately, in this country the Excise Authorities have put great obstacles in the way of experimenting with alcohol, but there seems a prospect now of a specially prepared alcohol fuel, which has been produced in South Africa, being available here. Quite new methods of low temperature distillation of coal give promise of greater supplies of benzol which is, of course, an excellent substitute for petroleum spirit.

Theoretically, a very great gain in economy should be possible by running motors on producer gas made by burning anthracite or some similar fuel, and engineers are now experimenting and have shown that vehicles can be run with a modified form of the suction gas producer which is in very general service with small stationary power plants.

The inconvenience of handling solid fuel and the attendant trouble which must occur in looking after a fire seem, however, to make it improbable that gas producers will be used to any great extent in this country as long as there are supplies of petrol at the present prices, but, in parts of the world where petrol costs about twice or three times as much and is difficult to obtain, there would seem to be a probability of very considerable development, as in these

undeveloped countries there are generally supplies of charcoal at a low price which forms perhaps the best possible fuel for a gas producer.

Having reviewed the present position, the writer will now consider in some detail the efforts that are being made by the designers of different types of vehicles to improve their efficiency.

Petrol Motor Vehicles

IT is common knowledge that an enormous number of alternative designs have been tried in recent years, but the one which has been generally adopted, as the result of practical experience, is that consisting of an internal combustion engine on the front of the vehicle placed over a steering axle, a disconnecting clutch and a change speed gear of the simplest possible form, namely a driving and driven shaft with gears of different ratios which can be slid in and out of mesh, the power being transmitted to the driving axle by a shaft operating a worm gear on the axle or by means of bevel drive. Chain gear is still employed in some cases but it is certain that it is being displaced by gear transmission.

There are, of course, a great many variations in the details of designs made on this general scheme, but it can be looked upon as the stereotyped design for a petrol vehicle or lorry to-day.

In considering the chances there are of any radical change one would ask, is it probable with increasing loads that builders will adopt a drive on all four wheels? Where vehicles are intended to run on made roads, in the writer's opinion, the complication of driving on more than one pair of wheels would always be a bar to the adoption of the system. For vehicles to run on un-made roads or across country, a 4-wheel drive has great advantages, but it is highly probable that, for these conditions, it will be more economical to use an ordinary lorry drawn by a special tractor.

If we assume that the vehicle will continue to be driven by one axle, what are the most likely features to be modified? Running costs are largely made up of fuel consumption and maintenance. There is no reason why a highly efficient motor and gearing should not exist with a minimum maintenance cost and with the best designs. It may be taken for granted that it does. But it is a very nice point for the designer so to proportion the parts of his mechanism that he does not make the size of the various parts of the mechanism so large, to reduce the stress and wear, that he unduly increases the weight of his machine and its consumption of fuel.

There are a great many lorries of foreign make, which

*Extract from paper read before the Institute of Transport Congress, England.

were purchased by the Government during the war, which are excellently but elaborately designed and which should have a long life, but which are not efficient from this cause. It is well known in the case of a petrol engine that there is still a considerable amount of energy, available in the fuel, wasted apart from the inevitable losses.

There have been innumerable schemes for improving the efficiency of the petrol engine but there has been no very great change since high-speed petrol motors were designed for cars and vehicles by De Dion-Bouton, and others.

There has, of course, been some improvement and, at the present day, the efficiency, as measured by ton miles per gallon of petrol, of different makes of vehicle varies very materially but, in view of the work which has already been done, it does not appear likely that we may look forward to any great improvement on the best of them in the near future. As regards transmission gears, every conceivable arrangement has been tried or patented but the simplest has survived. The epicyclic gear has, of course, had an enormous run when used as a single change of speed in the Ford, but has not been found satisfactory where more than one change is required, although it would appear in many ways to have advantages where constant changing is necessary.

The only alternative to the gear box transmissions, which is meeting with any success for commercial vehicles, seems to be the Stevens' electric drive consisting of a continuous current generator driven direct from the motor and which, in turn, drives the axle by means of an electro motor coupled to it by a propeller shaft or other means. By a simple controller the reverse and variations in torque are obtained, the speed of the vehicle being mainly varied by opening up or throttling the engine itself.

While the inevitable shock, which is often very small, of engaging the clutch and gear in the ordinary system is avoided and a very sweet drive obtained, the efficiency of the electric transmission is necessarily less than that of gear and a considerable additional weight is added to the vehicle. How far these are balanced by reduction in wear and tear is a matter for experience, but the designers of the system contend that there is an advantage on the side of the electric transmission.

Ease with which renewals and repairs can be effected is, of course, most important. It is found in practice that some designs which run quite well are most expensive to open up and repair. The repair question is looked at from a different point of view by the comparatively small owner to the users of large fleets as, in the case of large fleets, it is often customary to substitute complete new units, motor gear, transmission or axle. A design in which the unit can be removed with the minimum of labor is not necessarily one in which repairs can be easily effected to the units in position on the chassis. The ideal that designers should strive for is, no doubt, a combination of the best facilities for both alternatives of repair.

The leading British makers have not followed American designers in combining their engines and gear boxes. The arrangement has undoubted advantages in the first cost of manufacture and would seem, in many ways, theoretically right, but, so far, in practice it has not proved best for commercial vehicles. Many of the advantages of the combination of motor and gear box can be obtained by

mounting the motor and a separate transmission gear on a common frame which can be fitted and removed as a whole from the chassis if desired, and, at the same time, admits of the separate removal or opening up of the gear box or engine in position if it is preferred to do so.

With regard to the motor itself, designers are continuously working to obtain greater economy, not only of fuel but of oil consumption. Probably every alternative valve position and gear has been tried as well as various types of sleeve-valve arrangement. The present record in this country is, however, held by what may be described as a well-designed normal type of motor with the inlet valve placed over the exhaust. In the hope of obtaining still better economy, on the Continent a number of engineers are working at engines with high compression and, in some cases, trying to use small motors of the pure Diesel type. If a small Diesel engine could be made with a considerable range of power and revolutions, it would, of course, be a great stride and not only most useful for motor vehicles but for all sorts of other purposes, but experience with motors of this type ranging over a number of years does not make it seem at all probable that we shall have motors of this type fitted to lorries at an early date.

The writer mentioned, at an early stage, the advantage

which designers at the present day had of being able to employ greatly improved material, and it seems probable that we shall have the possibility of employing aluminum to a greater extent owing to the improvements in its alloys which are being made. A short time ago, it would have been looked upon as impossible to use cast aluminum road wheels, but they have been in service now with a number of vehicles with success for a considerable time. The

extent to which its employment will increase will no doubt depend to a great extent on the price at which it will be produced in comparison with cast iron and steel. Coupled to some extent with the employment of aluminum for various parts of the lorry will be, it is thought, the use of pneumatic instead of solid rubber tires.

The solid rubber tire not only enables increased speeds to be obtained but has enabled the structure of the vehicle to be made very much lighter than it would stand if it had to run without them and, if a pneumatic tire is employed, there is no doubt that there are parts of the vehicle at present made in steel which would hold up satisfactorily in a suitable aluminum alloy.

The relative advantages of solid versus pneumatic tires are difficult to decide. For passenger vehicles and lorries taking fairly heavy loads, with the present cost of pneumatic tires it seems very doubtful if they are worth while except in certain special cases. For the heavier loads, the pressures required in the tires are so great that the shocks to the road do not seem to be very much less.

It, therefore, might be argued that, from the point of view of damage to the road, there is little gain. From trials which have been made, it seems difficult to prove by measurement that the pneumatic tire greatly reduced the vertical motion of the vehicle by absorbing the bumps and inequalities in the road surface but there is no question that the sensation in a char-a-banc or lorry on pneumatic tires is very much easier and that, while there may not be a great difference in the actual motion, innumerable small jars and stresses which would be transmitted to the

HERE is what an English expert thinks about motor truck and bus design. His views, while taken from the standpoint of British problems, are well worth the attention of American design and production men.

Several statements are made with which American engineers are likely to disagree.

The article is interesting as giving the ideas of an expert British observer about the future of commercial vehicle design.

vehicle are actually absorbed, although the vertical motion which is set up in the axle by passing over a bump does not die out so quickly as in the case of a solid-tired wheel.

Unless road authorities decide that much less damage is caused by pneumatic tires and obtain legislation to support them, it does not seem probable that there will be any greatly extended use for the heavier class of vehicles, failing a great reduction in their first cost and the lessening of some of the other disadvantages.

WHILE the designers of the chassis have been doing their best to save weight, with the exception of the London General Omnibus Co. and a few others, little has been done to improve the construction of the body work of passenger or goods vehicles. A great deal of this work has been left to the coach builder who, no longer having responsibility for the complete vehicle, seems to care very little what his part of it weighs. When goods are carried on a plain lorry platform, the weight is a small proportion of the load, but, in the case of a high-sided or box van, it becomes quite a large proportion.

The large carriers and railway companies are now finding it economical to make up their loads on special platforms or in containers which are handled by cranes or on wheel trolleys in the yards and depots and then placed completely laden on the chassis to be conveyed to another center. The weight of these containers is often a very large proportion of the load and to obtain really economical results with this system it is evident that considerable improvement must be made.

Mechanical handling devices are now being called for to a large extent, power tipping gears and cranes being the most frequent. With the petrol or electric vehicle, which is almost invariably driven by one man, devices of this sort are most valuable. With vehicles normally carry-

ing two men, the handling of comparatively heavy loads is, of course, easier, provided both men help. Experience with these devices is hardly sufficient yet to say whether mechanical drive from the motor itself or the hydraulic system operated by a pump driven on the motor will prove best, but there seem to be indications that a hydraulic system is in favor, excepting for electric vehicles where an independent electric motor is obviously the most suitable. To keep the overall dimensions of a vehicle as small as possible is, of course, very important for traffic considerations and maneuvering in depots.

With a steam driven vehicle it is impossible to place the boiler below the carrying platform or body. Many of the earlier designers of internal combustion vehicles tried putting the motor as well as the gear below but, with somewhat unreliable motors, the practice was soon abandoned. Motors are now so reliable that it is less important to have such ready access, but it is still very desirable readily to be able to inspect them. There is no doubt that this is the reason for what may be looked upon as the present day standard design but, in the larger passenger vehicles and those for heavier loads, there is a tendency to give less space in the front of the vehicle to the motor and there is every probability of the arrangement in which the driver is placed alongside the motor instead of behind it, being further developed.

It will be gathered from the foregoing remarks that until the physicists and chemists discover some new source of energy or means of storing it, the writer does not think it probable that there will be any great change in the design of present-day road vehicles, and that engineers will have to content themselves with devoting their attention to improving details of design with a view to getting the best possible economy out of the fuel available and making the machines as simple as possible to maintain.

Unusual Spring Design in New Indiana Truck

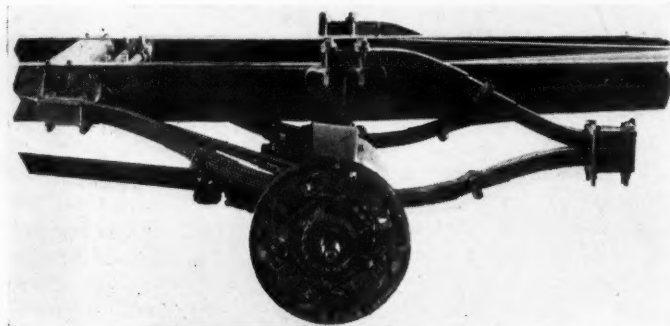
THREE-QUARTER elliptic springs of unusual design are a feature of the new Indiana one-ton speed truck which will be known as the Highway Express. These springs are used in both front and rear. The construction is such that shackles and ground bolts are eliminated, thus making lubrication at these points unnecessary. The drive is through the springs and the driving strains are carried by a number of main plates instead of by one main plate as in the conventional construction.

The power plant is a four-cylinder Waukesha with 3 $\frac{3}{4}$ -in. bore and 5 $\frac{1}{4}$ -in. stroke. The carbureter is a Stromberg and ignition is by Bosch generator and distributor with Presto-Lite battery. Starting motor, motometer and

electric horn are regular equipment. The clutch and gearset are mounted as a unit with the power plant and are of Brown-Lipe manufacture. The rear axle is a semi-floating type with spiral bevel drive. The pressed steel frame is 5 7/16 in. deep with 3 $\frac{1}{4}$ -in. flanges. The wheelbase is 132 in. Disk steel wheels with 34 x 5 in. pneumatic tires are standard.

The capacity of the truck is 2000 lb. with a body allowance of 900 lb. The maximum speed is between 30 and 35 miles per hour. The engine speed at 33 miles per hour is 2000 r.p.m. The truck is said to have done 13.4 miles per gallon of gasoline on test.

The price is \$1,425. The manufacturer is the Indiana Truck Corp.



Three-quarter elliptic springs used on new Indiana truck

Detailed Design Changes in Bethlehem Truck Models

THE use of a Wisconsin Parts Co. double reduction type axle, in place of the make formerly used, is the chief change to be noted in the new truck line just announced by the Bethlehem Motors Corporation. One-ton, 2-ton and 3-ton trucks comprise the Bethlehem line, the prices being \$1,195, \$1,595, and \$2,195, respectively.

Electrical equipment is standard on all models. In addition to the axle change on the 2-ton job, two leaves have been added to the rear spring. The motors on all models are similar in construction, differing only in size. They are manufactured by the Bethlehem Motors Corp.

A New Method for Determining Engine Friction Losses

Method based on idea that friction couple varies with engine torque and consequently with mean effective pressure. Developed by G. Lumet, Laboratory Engineer of Automobile Club of France

WHILE the thermo-dynamic theory of the internal combustion engine is highly developed, the theory of the mechanical losses is in a rather embryonic state. This may be due to the multiplicity of the factors affecting the friction losses. A determination of these losses is, however, of considerable importance, as it furnishes a valuable criterion of the workmanship embodied in the engine.

In steam engine practice the friction losses are determined either by measuring the brake horsepower and the indicated horsepower at full load and taking the difference, or by measuring the indicated horsepower when running idle. The first named method is quite satisfactory as long as the indicator furnishes reliable cards, but the field of application of this method is limited by the limitations of the indicator. The second method is based on the assumption of equality of friction losses under full load and when idling, respectively, and this assumption is entirely unwarranted in the case of internal combustion engines. The application of this method is apt to give very deceptive results, and M. Witz, the well known French gas engine expert, who used this method, was led by it to ascribe to a certain engine a mechanical efficiency of 93.4 per cent at full load, whereas Prof. Riedler, whose competence in such matters he acknowledges, found a mechanical efficiency for an engine of practically the same size of only 83.1 per cent. The engines referred to were of 1500 hp. and such discrepancies as here mentioned are entirely too great to be passed by. In the first case the losses would have been 6.6 per cent and in the second case 16.9 per cent or nearly three times as great. The difference must have been largely due to errors inherent in the experimental methods employed.

ANEW method for determining friction losses has been proposed by G. Lumet, laboratory engineer of the Automobile Club of France, in a book entitled "General Investigation of the Influence on the Power of an Internal Combustion Engine and on Its Specific Fuel Consumption, of Different Modifications in Its Method of Operation." This method is based on the following idea: The friction couple varies with the engine couple or torque, and, consequently, with the mean effective pressure as determined from the indicator diagram, of which it is a linear function. By "mean effective pressure" is here meant the mean gaseous pressure in the cylinder throughout the four strokes of the cycle. The problem may be simplified by assuming that during the inlet and exhaust strokes the gas pressure within the cylinders is nil.

The research made by M. Lumet brought out the fact that it is absolutely necessary to take into consideration two other items of loss, the inertia forces and the so-called pumping losses. In measuring the friction losses

the engine may be operated from an outside source of power in two different ways:

1—The cylinder being constantly in full communication with the atmosphere.

2—The cylinder drawing in, compressing, expanding and exhausting a charge of air.

Calculations based on the results of these tests were put in the following form:

In order to take account of the inertia forces, which may be expressed as a certain number of pounds per square inch of piston head area, the indicator diagram should be modified by adding the corresponding inertia forces algebraically at each point. That is, if the force of inertia is in the same direction as the gas pressure it should be added to the pressure indicated by the diagram, and if in the opposite direction it should be subtracted. If

$$p = p_g + p_i$$

is the instantaneous pressure thus obtained, the mean pressure of the modified diagram will be given by the expression

$$\frac{l}{V} \int \frac{V + v}{p} d\phi$$

taken successively for the four strokes of the cycle.

Let t_p be the resisting couple or torque corresponding to the pumping losses in test No. 2 and t_f the resisting torque due to the friction for any particular value of p . Under the conditions of test No. 1 we have

$$p = p_i;$$

that is, the mean pressure is due solely to the inertia, the gas pressure p_g being constantly nil. The resisting torque t_f^1 is due entirely to the friction.

Under the conditions of test No. 2 the pressure is p , but the couple due solely to the friction is not the resisting couple or torque t_f^2 directly measured, but, rather, $t_f^2 - t_p$. The equation of the straight line representing the friction in the coordinate system p, t_f is, therefore,

$$t_f = t_f^1 - \frac{t_f^2 - t_p - t_f^1}{p_2 - p_1} + \frac{t_f^2 - t_p - t_f^1}{p_2 - p_1} x \quad p = a + bp.$$

It is this equation which was verified experimentally by M. Lumet by measuring the values of t_f corresponding to different values of p for a large number of cases and by entirely different methods. This research showed that the expression

$$t_f = a + bp$$

represents the variation of the friction torque in a very satisfactory manner. In this equation t_f represents the total no-load torque, a and b are constants and p is the algebraic sum of the gas pressure and the inertia pressure averaged for the four strokes of the cycle.

Properties and Methods of Using Duralumin

This new aluminum alloy has about the same ultimate strength as structural steel, but weighs one-third as much. It can be heat-treated, rolled, stamped, cast, forged, welded and readily machined. Takes a durable polish and possesses physical characteristics which render it of potential value to the automotive industry.

DURALUMIN is a light alloy of aluminum whose striking properties were discovered in experiments and investigations carried on from 1903 to 1911 by A. Wilm, a German scientist. His work has since been supplemented by European and American scientists. Duralumin is the commercial name given to aluminum base alloys having a copper content up to approximately 4 per cent, and a magnesium content up to approximately 1 per cent. It also contains some manganese and is never found without impurities of iron and silicon.

Chemical and Physical Properties

The chemical composition of duralumin varies between the following limits which have been found to give the most satisfactory results:

Copper	3.5 to 4.5 per cent
Magnesium	0.2 to 0.75 per cent
Manganese	0.4 to 1.0 per cent
Aluminum	Balance (not less than 92 per cent)

The total impurities should not exceed 1 per cent.

The outstanding property of duralumin which makes it so very useful commercially is that it combines great strength with a very low specific gravity.

The following are some of its physical properties:

Specific gravity.....	2.8 to 2.85
Melting range, degrees Fahr.	1000 to 1200
Young's modulus, psi,* tempered	10,000,000
Compressive strength, psi, tempered.....	44,000
Shear strength, psi, tempered.....	30,000
Tensile strength, psi, tempered.....	50,000 to 60,000
Coef. of linear expansion0000126° F.
Per cent elongation in 2 in., tempered.....	.16 to 20
Weight per cu. in. (assuming sp. gr. 2.80) lbs....	0.10101

The electrolytic metals negative to duralumin are copper, brass, bronze, iron and steel, and these metals should never be joined to duralumin where subject to moisture.

Another property which makes duralumin valuable commercially is that the metal will harden after heat treatment, but not until some time has elapsed. This permits working the metal into the desired shapes and flattening and straightening of the pieces where necessary, before hardening begins.

Due to the fact that duralumin is non-magnetic and since it resists corrosion of the atmosphere quite well, it is being used for compasses and similar instruments where this property would make its use beneficial. Duralumin is practically unaffected by the action of sea water, although under corresponding circumstances

aluminum is quickly reduced to the white oxide. When buffed duralumin takes a very fine polish and is similar in this respect to silver, but, owing to its freedom to corrosion and the fact that it does not tarnish in the presence of sulphuretted hydrogen and similar gases, this surface lasts for a very considerable time before becoming dull.

Duralumin is less subject to corrosion after tempering than in the annealed, cast, or forged conditions.

As a result of welding and soldering the adjacent material is annealed. Without subsequent heat treating and with exposure to the salt spray test after the welding, it was noted that the adjacent plate was annealed along a parallel band, and that between the annealed and tempered material there appeared to be a band which was badly corroded. The welded joint did not corrode and the tempered material resisted the corrosion. Heat treating will correct the above difficulties and may follow directly after the welding.

Corrosion of duralumin can be deterred by the application of a thin coat of spar varnish which adds about 20 grams per square meter for both sides of the material.

A Good Conductor of Electricity

Duralumin is a good conductor of electricity, and in wet locations is subject to the injurious effects of electrolysis unless well grounded.

Paints containing metallic oxides, particularly those containing lead oxide and carbonate, such as white lead, red lead, etc., are liable to produce corrosive effects. Even the regular aircraft dope will give rise to slight surface corrosion if it contains chlorine compounds, such as tetra chlorethane, although this is not particularly serious due to the fact that there is only a small amount of chlorine present, hence progressive corrosion does not occur. It is best to use only bituminous varnish or some similar non-metallic coating.

The strength of duralumin depends not only upon its chemical composition but to a greater degree upon the heat treatment to which it is subjected. Tests show that when duralumin is quenched from temperatures up to 572 deg. Fahr. it is annealed and very much softened so that it can be cold worked. Quenching from higher temperatures up to about 970 deg. Fahr. results in an increase in the hardness. Beyond this temperature the hardness decreases rapidly, a dark gray coat of oxide is formed and the surface blisters. Fig. 1 shows the variation of tensile strength and elongation with temperature of heat treatment. It has been found that the tensile strength of duralumin varies almost directly as the hardness, and therefore the maximum hardness is

*The term psi is an abbreviation for pounds per square inch.

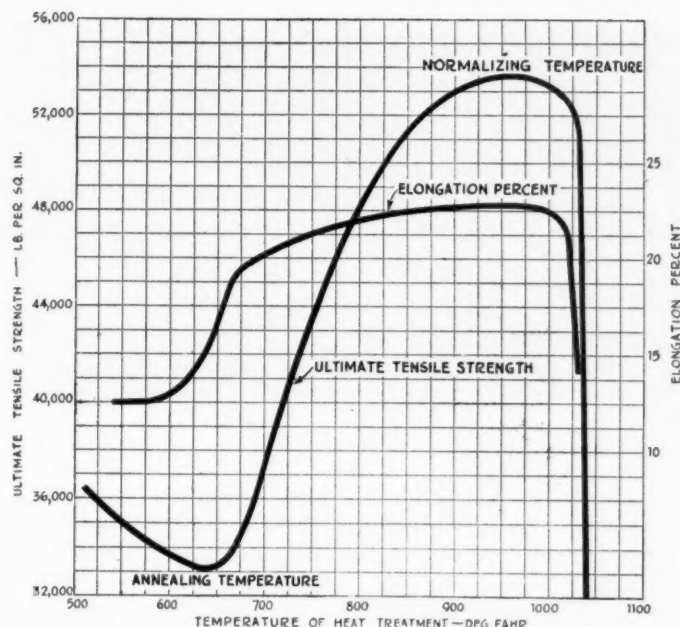


Fig. 1—Effect of heat treatment upon strength and elongation of duralumin

sought in order to obtain the strongest material.

A peculiar phenomenon exhibited by duralumin is the fact that immediately after quenching it is not very hard but the hardness increases with age for a period of about four days after which it is approximately constant.

Fig. 2 shows some gasoline tank ends which are approximately 36 in. in diameter. These tank ends have been spun on a lathe, and they show how easily the metal can be worked while in the softened condition. After aging they form an extremely strong and rigid member.

Tests have shown that when copper is present without magnesium or magnesium is present without copper the product is harder than pure aluminum, but that the maximum hardness is obtained when both are present. The hardening is analogous to that of steel which is due chiefly to the suppression of the cementite precipitation (pearlite). Similarly, the hardening of duralumin is due to the suppression of the precipitation of the eutectic CuAl_2 by sudden cooling, and the subsequent precipitation of that compound in highly dispersed form in the process of aging. It is the formation of this highly dispersed precipitate which causes the hardness. The function of the magnesium is not definitely known, but it is thought to be of secondary nature, aiding in the hardness caused by the copper. It may act in one or more of the following ways: (1) by removing the silicon by uniting with it to form Mg_2Si ; (2) by hardening the aluminum matrix and thus affecting the dispersion of the CuAl_2 precipitate; (3) by forming crystals of Mg_2Si which affect the formation of CuAl_2 crystals.

The following is taken from the Bulletin of the American Institute of Mining and Metallurgical Engineers:

"Duralumin after rolling shows a structure similar to that in Fig. 3, which is quite typical. Fig. 4 shows the same alloy at a higher magnification. Grains of aluminum (in which are dissolved Si, CuAl_2 , and Mg_2Al) are surrounded by strings or islands of eutectic (CuAl_2 —aluminum, FeAl_3 —aluminum and possibly others), which are white in Fig. 3. Upon examination under a higher power, the eutectic is seen to consist of two constituents; one a brownish color, the other white. These two constituents are evident in Fig. 4, and have been identified as FeAl_3 (brown) and CuAl_2 (white), respectively. Quite often the FeAl_3 surrounds the CuAl_2 , as is shown in the illustration.

Besides these two constituents, a third, of pronounced bluish color, is visible. This is readily distinguished under the microscope, not always so readily in a photograph; it is seen within an island of CuAl_2 in Fig. 5. It is believed that this is Mg_2Si ; it occurs only in alloys containing magnesium.

"Samples, some of which had been treated at 932 deg. Fahr. quenched in water, and immediately etched, and some of which had been subsequently aged at 266 deg. Fahr., after identical treatment to develop maximum hardness, were carefully compared in their appearance after etching in the same solution (0.1 per cent NaOH) and for the same periods of time. No difference was observed in the structure nor in the general shades of the etched surfaces of the two groups of specimens."

Correct heat treatment is essential if the best properties of the metal are to be developed to their fullest extent. Unlike the corresponding treatments of steel the temperatures necessary are relatively low and easily controllable.

The best method of heating the material uniformly and satisfactorily is by means of a salt bath. This can be made up in a rectangular iron or steel trough, arranged in a brick setting, and partly filled with a mixture of potassium and sodium nitrates (equal proportions of each) over a covered heating furnace. It is found that the heat required to keep the bath at a constant temperature is greatly reduced if a sheet iron lid which is protected by a layer of asbestos is so arranged as to be capable of being lowered over the bath at such times as articles are not being put in and taken out or the furnace.

Accurate thermometers and pyrometers should be inserted in the salt mixture to insure its being heated to the correct temperatures.

The articles to be treated are left in the molten salts until they are uniformly heated to the proper temperature and are then withdrawn and quenched in water or oil.

It should be noted that no damage can occur to the material by leaving it in the bath for a longer period than is actually necessary, providing the temperature is kept constant. On the other hand, ample time should be allowed for the articles to heat through if the best results are to be obtained.

Annealing

Duralumin when treated in the normal manner becomes too hard to work satisfactorily in the cold state. Consequently, when any cold work is to be put on the

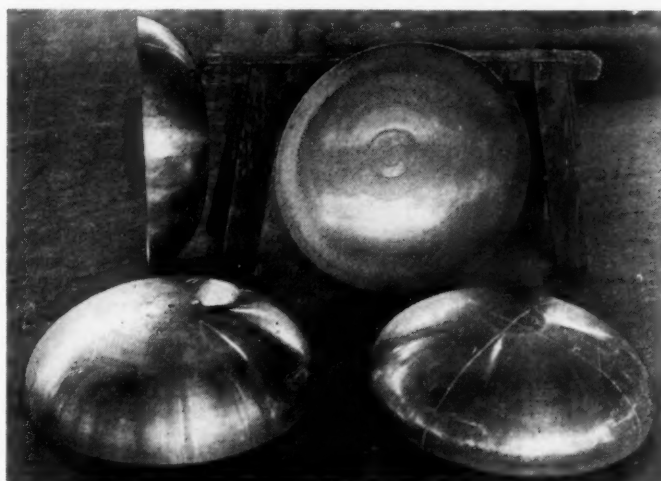


Fig. 2—Drum head spinnings made from duralumin



Fig. 3

Fig. 4

Fig. 5

Figs. 3, 4 and 5—Micrographs showing physical structure of duralumin

material the latter must be annealed. Moreover, if considerable work must be done on it the material will, like brass, require annealing between successive operations. For such shapes as can be produced by a single operation of the dies annealing is not applied, but the material is heat treated or "normalized" (as described below), and the working follows while the material is still in the primary stages of the aging process.

For such pieces as cannot be produced in one single action, or with one single heating, the last heating should be the normalizing one. The product can be annealed many times without injury to the material. In any case the annealed product is finally subjected to normalizing in order to restore the original ductility and to slightly increase the other mechanical properties.

Normalizing or Tempering

Annealing is accomplished by immersion in the molten salts or in a suitable muffle furnace if the temperature can be regulated absolutely. The article to be annealed should be left in the bath for a period which can be roughly computed by the following rule: Take the least dimension of the article in inches, that is, the thickness in the case of plate, the diameter in the case of bar, etc. Calculate the square root of this dimension and multiply by 80, which will give the *minimum* number of minutes for which the article should be left in the bath. The temperature range should be from 662 to 716 deg. Fahr. At the end of the specified period the articles are taken out and quenched either in water or in a good quality oil or they can simply be air cooled. The working of the pieces should follow closely and should be completed within three hours due to the fact that the effect of the annealing goes fairly rapidly. The material at the end of three or four days after annealing

returns to a semi-hard condition with an ultimate strength of about 42,000 lb. per sq. in.

For final treatment the material should be uniformly heated to 842 or 932 deg. Fahr., and then quenched in water or a good quality oil. The time for which the material should be left in the bath for normalizing may be obtained by the following rule: Take the square root of the minimum dimension in inches and multiply this by 60, and the result will be the *minimum* number of minutes required.

As soon as the product is placed in the quenching bath it commences to harden and starts the aging process. This process results in the slow growth of the tensile strength, hardness and yield point, and the rapid growth of the per cent elongation. The aging starts at once and attains about one-half of its normal stable condition inside of the first half hour, progressively increasing therefrom for the next three hours, and slowly increasing thereafter for the next 96 hours. Very little increase is found after that time and 96 hours' duration after quenching is sufficient for tensile tests to be made of the material. A curve of the increase of tensile strength with aging is shown in Fig. 6.

Hardness Becomes Permanent

The peculiar behavior of duralumin in gradually hardening after heat treatment gave rise when the metal was first introduced to certain natural misgivings as to whether the material in the hardened condition would be permanent and stable, but a recent test on some of the material which had been exposed in the open for about eight years showed the same strength as was obtained within a week after treatment. These same specimens showed only a very faint discoloration due to the presence of oxide, although exposed in the open air alongside a dock where the atmosphere is naturally moist.

Bending or any similar work required should be completed within an hour after normalizing, but if it is delayed after this the cracking of the material may give trouble.

Rivets are always softened for use at the normalizing temperature and are rivetted up within one hour of the treatment.

This property of remaining soft immediately after the treatment and later hardening up makes duralumin unique among metals. Thin sections or plates often buckle or warp during heat treatment, but it is possible to straighten these by suitable dies or rolls while the metal is still soft. This is a particularly useful property in the case of members intended to take compressive loads, such as tubular struts. In the case of high tensile strength steel which, from the point of view of strength for a given weight, is often more economical than duralumin in tension, warping always occurs

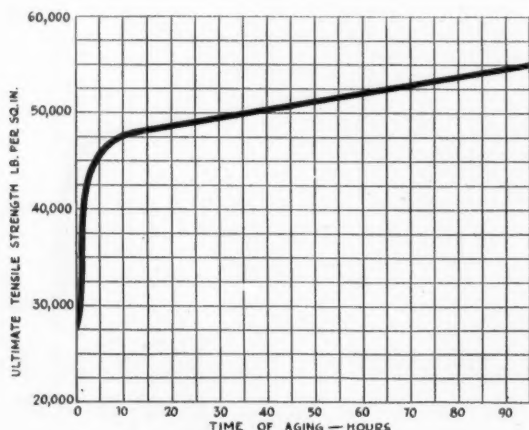


Fig. 6—Effect of aging upon tensile strength of duralumin

in heat treatment. Hence, when used as struts, alloy steels are less reliable than duralumin, since in the hardened condition they can be made perfectly straight only with great difficulty.

If the metal is overheated to 1022 deg. Fahr. the strength falls off very rapidly, and the material becomes extremely hard and brittle. Even when treated between 968 and 1022 deg. Fahr. it is found that the metal is to a certain extent unreliable. For ordinary commercial purposes the most satisfactory results are obtained by fixing the temperature of treatment between the limits of 896 and 950 deg. Fahr. It is essential that an accurate pyrometer be used, and that the temperature of the bath be carefully controlled.

Since it is not practicable to raise and lower the temperature of the bath over a short period of time it is usual practice to either keep two baths running, one for annealing and the other for normalizing, or else to do all the annealing during the night and the normalizing during the day and in this way use the same bath for both.

It has been found that heat treating articles to 896 deg. Fahr., then quenching in water at room temperature, resulted in considerable buckling and twisting. The practice has therefore been modified so that articles are heat treated at about 915 deg. Fahr. and quenched in hot water, temperature about 194 deg. Fahr. This results in less warping.

Quenching

No difference is found in results from quenching in water or non-acid oil, but it is the practice to alter the quenching process to suit the ultimate handling of the pieces. If the pieces are to be formed or worked the quenching medium is kept at a temperature of about 212 deg. Fahr., or that of boiling water, since the aging is somewhat retarded in this way. This method affords an opportunity to form or shape the product before the maximum aging condition is reached. Mechanical working of the piece also hastens the aging process.

If the pieces are not to be worked after quenching the latter may be carried out at ordinary room or shop temperature. Aging may be extremely hastened by allowing the pieces to cool off in the quenching bath for two or three hours, either in hot or cold mediums.

Quenching in cold water leaves the metal softer immediately thereafter than does quenching in boiling water. Oil leaves the metal slightly harder than cold water, but softer than boiling water. Very little difference is noted after the first day's aging. The yield point, ultimate tensile strength, elongation and reduction of area are all practically the same after fully aging.

For parts which are to be worked immediately after heat treatment, where the working will take but a short time and where slight warping will be immaterial, cold water should be used as a quenching medium for by its use maximum softness can be obtained. For quenching

*Some of the qualities necessary in a satisfactory quenching oil are:

- (1) Suitable quenching speed.
- (2) Uniformity of quenching speed at various oil temperatures (i. e. from room temperature to about 250 deg. Fahr.)
- (3) High flash and fire points.
- (4) Permanence of qualities after continued use or storage (freedom of deterioration by distillation, oxidation, or other changes in composition, absorption of moisture, etc.)
- (5) Freedom from corrosive elements.
- (6) Freedom from objectionable odors.
- (7) Uniformity of supply (batches purchased at diverse times should have the same quenching speed and other qualities.)
- (8) Reasonable cost.

Animal and vegetable oils are liable to deteriorate by oxidation; mineral oils by evaporation of the lighter constituents. This may cause thickening which will change the quenching speed of the oil. Compound oils may combine these difficulties. Flash and fire points, viscosity, specific gravity, and specific heat, when new do not fully determine the suitability of the oil. An actual service test for a long period of time is at present the best standard in the selection of a suitable oil.

of pieces that slight warping might injure, boiling water or oil should be used. Oil* is not as satisfactory as boiling water where the parts have been heated in the nitrate bath, since the nitrate must be removed by washing in water after the pieces are taken from the oil. However, oil is more desirable when heating is done in an electric furnace since the oil does not have to be heated for its successful use.

Heat Treatment for Forging, Stamping, Etc.

The material should be heated in a muffle oven to a temperature of between 716 and 788 deg. Fahr., and since it is essential that the temperature remain within these limits a pyrometer should be arranged to record the temperature.

It is sometimes found, however, that owing to the distribution of the stamps it is not always convenient to have a muffle that will serve all sizes of stamps. In these cases the stampers build up a Smith's hearth and heat the end of the bar prior to forging, in which case it is impossible to have a pyrometer which will show the actual temperature. However, the stamper soon ascertains by experience the correct temperature. Trials may be made with paper, the approximate temperature being such that it will brown a piece of ordinary newspaper.

The forging and stamping work should be done as soon as the metal leaves the muffle. No definite rule can be given as to the time when the metal requires reheating, but it soon becomes evident when the metal becomes too cold as it will give a decided ring and will probably crack.

It is essential that a temperature of 788 deg. Fahr. should not be exceeded otherwise cracks will be caused.

The final heat treatment of drop forgings should always be carried out in the salt bath, and not in the muffle furnace as it is practically impossible to insure all parts of a muffle furnace being at a temperature such as recorded by the pyrometer.

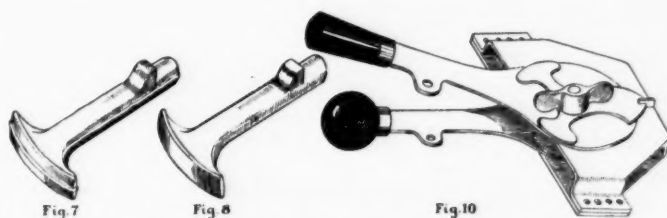


Fig. 7—Rough duralumin forging. Fig. 8—Finished forging for Cadillac hood catch. Fig. 10—Airplane throttle control in which the bolt and wing nut are duralumin forgings and the spring and other parts are made from sheet rolled from the same alloy

Figs. 7 and 8 show an adaptation of duralumin to the automotive field. Fig. 7 shows a Cadillac hood clamp which has been drop forged. Fig. 8 shows the same clamp after grinding and buffing. No further finish need be given after a thorough buffing which leaves the piece perfectly smooth and with a mirror-like surface very similar to a bright silver plating. This surface resists corrosion and holds its finish for a long while without the application of any protecting coating. Since duralumin furnishes a very light, strong, easily finished material which does not corrode in the atmosphere, it seems logical that its use will become varied and wide in the automotive field.

Duralumin can be cast and is free from blow holes. Everything in the form of scrap duralumin can be melted and cast. It has been found that this material on cast-

ing has shown a slight loss in magnesium content. This loss seems to run pretty nearly the same and hence sufficient magnesium can be added in the form of aluminum magnesium alloy to assure a correct chemical composition. The molten metal is thoroughly skimmed just prior to casting. No flux or protective coating need be used. The casting temperature is about 1300 deg. Fahr. Cast iron molds are employed.

Welding and Soldering

Preliminary tests with soldered joints indicate that this process will not be generally employed due to the fact that local heating anneals the adjacent duralumin and leaves it subject to corrosion, as already noted. This annealed duralumin cannot be normalized, due to the fact that the heat treatment would melt the solder. Acetylene welded joints are possible, and are made with the use of a duralumin flux. The heat of the welding anneals the adjacent duralumin, but this can be renormalized since the heat treatment will not melt the weld.

Welded joints have shown an efficiency of about 70 per cent after heat treating the piece and dressing down the weld to the same gage as the surrounding plate.

Influence of Heat and Cold

Heat has an important influence on the strength of duralumin. According to the results obtained in tests by the Central Bureau for Scientific Investigation, Neubabelsberg, when heated the strength decreases 10 per cent for an increase in temperature of 212 deg. Fahr. and about 20 per cent for an increase of 300 deg. Fahr. The loss of strength increases with the increase of temperature. The elongation increases on first heating to a hardly appreciable extent, while between 300 and 392 deg. Fahr. it decreases. At 482 deg. Fahr. the elongation becomes the same as at room temperatures. Consequently, whenever duralumin is exposed to heat the possible decrease of strength should always be considered.

As opposed to the foregoing the influence of cooling upon the strength properties is less unfavorable. The Central Bureau for Scientific Investigation has made tests on this also. The strength and elongation increase somewhat with the decrease in temperature. The work represented by a blow in the impact tests is not decreased when the material is affected by cold so that one can safely assume that reasonable decreases in temperature have no unfavorable influence on duralumin.

Plate Rolling

The metal is most widely used in plate or in articles made from plate. Plate is produced directly from the ingot. After thorough preheating the ingot is passed through the plate rolls until the plate is reduced to the desired gage. If necessary the plate is trimmed and annealed between rollings. Table I shows how the tensile strength, hardness and yield point increase, while at the same time the ductility decreases with rolling.

TABLE I

Tensile lb. per sq. in.	Yield Point, lb. per sq. in.	Brinell Test, 10 mm. ball, 500 kg. load	Elongation, per cent in 2 in.
30,000	20,000	50 to 60	20 to 15
35,000	25,000	60 to 70	15 to 5
40,000	30,000	70 to 80	5 to 2.5
45,000	35,000	80 to 90	2.5 to 2.0
50,000	40,000	90 to 100	2.0 to 1.5
55,000	45,000	100 to 110	1.5 to 1.0

Tempered plate can be punched, sheared, drilled or faced with no injury to the mechanical properties, but injury will result if it is flanged or bent to a 90 deg. angle without providing an easy radius. The latter is,

at the minimum, twice the gage of the plate. Only slight difference is found in the mechanical properties of plate relative to the directions of tests, whether across or along the direction of rolling, or between the relative strength of punched and drilled holes. However, it is known that products, the parent plate material of which showed 18 per cent elongation, have only about 10 per cent elongation after they are finished. Such reduction is due to the working of the material, and is accompanied by an increased hardness. Tempered plate is generally buckled due to the aging.

Cold Rolling Tempered Plate

Cold rolling tempered plate will take most of the buckling out, but the elongation will be lowered. At the same time the tensile strength, hardness and yield point will increase.

Table 2 shows the approximate effects of cold rolling tempered plate.

TABLE 2

Tensile lb. per sq. in.	Yield Point, lb. per sq. in.	Brinell Test, 10 mm. ball, 500 kg. load	Elongation, per cent in 2 in.
60,000	35,000	110 to 120	15 to 12
65,000	50,000	120 to 130	12 to 5
70,000	60,000	130 to 140	5 to 2
75,000	70,000	140 to 160	2 to 1

The original ductility can be restored by again heat treating. This material, as well as that which has not been rerolled cold, should not be bent at a sharp angle. Both tempered and rerolled tempered material should be annealed before placing in forming dies which are to materially change the section or shape.

By passing tempered plate while cold through the rolls only once the elongation is found to decrease about 12 per cent in the case of the thin gages, but the buckling will be taken out of the plate and the gage reduced by about 0.001 in. No added heat treating will be necessary.

The rolled sections are produced from slitted plates. These strips are spooled and heat treated just prior to rolling. The treated strip is placed in the rolls while in the softened condition, and progresses from the elementary crimping set to the final finishing set in one operation. The strip and the developing section must be held laterally by roller guides. As the working is done while the aging is proceeding, internal stresses in the metal sometimes cause the finished pieces to be twisted, warped, or buckled, regularly or in waves. If this difficulty occurs in long regular waves the piece can be straightened by stretching, but the piece should not be stretched to more than 1.5 per cent of its original length.

Rolled Sections

It is more difficult to produce sections having flat sides, prescribed radii, and a well-defined contour in gages over 0.050 in. than in lighter gages. One stated requirement for rolled sections is that it must be possible to flatten out the section without developing cracks along the bend lines. It has been found possible to flatten out the rolled section having a gage of 0.079 in. and a radius of 0.175 in. inside of the section without cracking along the bend lines.

Whatever tolerances are applied to the rolled section should be applied to the parent plate for gage, to the strip for area, width and weight and to the finished section for height, width and slope of sides.

Rolled sections should not be bent at an angle up or down from the plane of the web, but the offset should be accomplished by means of an arc having not less than an 8-in. radius.

All pieces that are formed by dies should be inspected after production and after piercing, and pieces that show eccentric forming, eccentric piercing or that are cracked in any way should be discarded.

Wire, Rod, Rivets and Screws

Drawn wire of duralumin, tempered, shows a shear value ranging from 23,500 psi to 35,500 psi with an average of about 30,000 psi, and a tensile strength slightly higher than that of tempered plate. Rods are rolled or extruded and are used for forgings.

The drawn wire is used mostly for rivets, which are stamped in dies from annealed wire in coils. It is found that such rivets should not have flat heads due to cracking on the periphery of the head, but that button heads can be produced without suffering from this defect.

Preliminary investigation has shown that threads can be cut on the rod with ordinary hand dies, but better results are obtained by the use of the automatic screw machines in which the dies automatically recede from the rod on the return. Plenty of kerosene should be used as a lubricant in threading. It has also been found that paraffin forms a very good tool cooler in screwing or finishing machine parts of duralumin since it leaves an excellent surface.

The metal can be turned and machined at the same speed as brass, and it is found that it does not seize or drag the tool as do most other aluminum alloys.

Wood screws are rolled from the rod or produced in automatic machines. Tempered rod provides the cleanest threads.

Bars up to 2.5 in. are extruded. Over this size they are hammered. The latter are generally in the annealed state. Tubes of thin wall gage are drawn from the solid bar, and those of heavy gage, about 0.125 in., are extruded.

Strength Comparison

During a tensile test on duralumin it is often noticed that at loads of about 20,000 psi and over, a small extension takes place. When the metal was first used this gave rise to the belief that the yield point of the metal was abnormally low. Subsequent investigation has shown, however, that duralumin has several "false yield points." As the load is applied the material suddenly yields slightly at a low load, but instead of this yield continuing the metal remains elastic, and finally the true elastic limit and yield point occur in the neighborhood of a load of 32,000 psi. Often several such false yield points occur before the true yield point is reached. If the load is removed afterwards the yield at these lower values remains as a permanent set in the material; if the load is reapplied they do not occur again, the material obeying Hook's Law right up to the elastic limit.

A Stress Strain Curve Is Shown in Fig. 9

These false yields seem to be in the nature of molecular adjustments in the material under action of the load. This must, in practice, be looked upon as a useful property of the metal particularly when under the action of compressive load. If an ordinary material, such as steel, is tested in the form of a strut, large variations in the crippling loads are obtained unless the material is absolutely homogeneous, and axially loaded in all cases. In the case of duralumin struts much more uniform results are obtained, the reason being, perhaps, that the presence of these false yield points enables the material to adjust itself, to a certain extent, to the load placed on it.

Exactly similar effects probably occur when local stresses are high, as in the neighborhood of bolt holes, etc., the material adjusting itself to the load and at the same time retaining its elastic properties.

Thin plate is found to be stronger per unit than the heavier gages, and for this reason all test pieces from different sources should be similar. A comparison between the mechanical properties of the alloy in its different conditions is shown in Table 3.

TABLE 3

Condition Tested	Tensile lb. per sq. in.	Yield Point, lb. per sq. in.	Brinell 10 mm. ball 500 kg.	Shore Test	Elongation, per cent in 2 in.
As rolled...	40-55,000	20-45,000	75 to 100	30-45	2 to 5
Tempered X	50-55,000	23-28,000	85 to 100	30-40	16 to 20
Tempered Y	55-60,000	25-30,000	85 to 105	30-40	18 to 20
Annealed ..	28-35,000	15-18,000	48 to 70	17-30	14 to 20
Temp. Roll Z	60-75,000	35-50,000	110 to 150	35-50	10 to 1

Condition X is for thicker gages, from about 2 mm. up to 0.25 in., and Y is for thin gages. Condition Z is

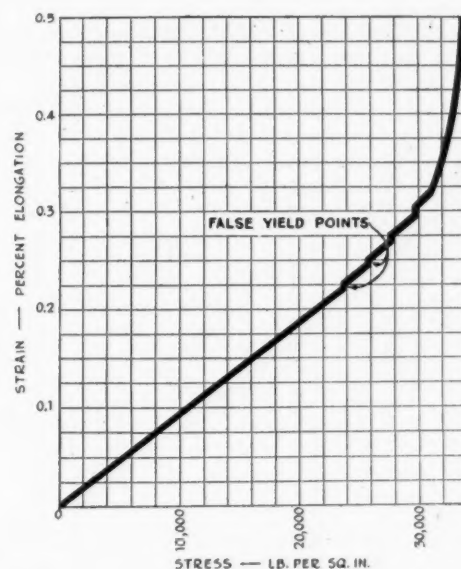


Fig. 9—Stress-strain diagram, showing false yield points

for the cold rolled material which has not had its original ductility restored by heat treating after the re-rolling.

Tension Members and Riveted Joints

The full tensile strength of approximately 55,000 psi can be relied on with confidence, and duralumin can be used for any part in which a combination of strength and lightness is desired. It should be noted, however, that where small holes are drilled in thin material, a small reduction in strength of the material surrounding the holes occurs, this probably being due to the heat produced by the drill.

The bearing pressure allowed on the rivets should not exceed 70,000 psi; above this elongation of the hole occurs. An ultimate shear of 24,000 psi can be allowed with confidence on the rivets in single shear.

These figures are based on two-thirds the corresponding strengths obtained as a result of tests of riveted joints of different proportions. Since for efficiency it is essential that ultimate failure should as far as possible be by shear, with the very thin plates and members usually found in duralumin construction, it is preferable to use a large number of small rivets rather than a few of large diameter.

From the standpoint of strength for a given weight duralumin, except in certain special cases, gives much better results than high strength steel or wood when similar members in each material are actually tested in compression.

THIS is due to the fact that high strength steel usually depends for its strength upon heat treatment and this same heat treatment usually causes warping, which very greatly reduces the strength in compression. As has already been mentioned duralumin can be worked for an hour after final treatment and hence can be made perfectly straight after treatment. In the case of timber struts, although theoretically these should be lighter for a given strength, it is found in practice that, except in special cases, owing to the reliability of the material being less, one cannot adopt such refinements in reducing weight as is possible in the case of duralumin. Hence the final weight in the case of a timber strut for a given strength is usually much greater than in the case of one of duralumin.

The ultimate tensile strength of duralumin is between 50,000 and 60,000 psi, which is the same value specified for structural steel. Its specific gravity is about one-third that of steel. It is this combination of strength with light

weight that gives duralumin its value as a structural material. Naturally it has found its chief use up to the present in the construction of aircraft.

Fig. 10 gives an idea of the variety of uses to which duralumin can be put. The device shown is a standard throttle and spark control for an airplane, which is made entirely of duralumin with the exception of the tops of the levers, which are of wood. The bolt and wing nut are drop forgings of duralumin. The springs, housing and levers are made up from sheet duralumin. The whole device is fully as serviceable, and weighs only one-third as much as the old type which was made up of sheet steel.

Duralumin was first used in the framework of dirigibles by the Germans, who soon were followed by the British. More recently it has been used in heavier-than-air craft, first, for struts and booms and now for the wings themselves. An example of this type of construction is the German airplane brought to this country a few months ago, which was constructed entirely of duralumin. Undoubtedly the use of duralumin is only in its infancy and when its manufacture has become better standardized it will displace other materials in quite varied uses.

A Bandit-Proof Truck Body

AN armored truck body has been developed for use by banks, chain store organizations, trust companies, and industrial concerns which find it necessary to transport large sums of money from one place to another.

The appearance is somewhat similar to the ordinary light delivery body. The entire interior is lined with a light tough bullet-proof steel, capable of resisting the largest revolver bullet at close range. All the windows, windshields and portholes are fitted with shatterless bullet-proof glass, and the windows and porthole shutters are fitted with geared window lifts to hold them in any position desired. No running boards, door handles or other unnecessary projections are afforded the thug who attempts to hold up the truck while in motion. A step is provided at the entrance door of course, but it automatically folds up when the door is closed. In place of the usual seat in the cab running its entire width, a single driver's seat is provided, which makes available a space for a locked door connecting the cab with the body.



An armored, bandit-proof truck body

The inside of the body is provided with folding cushion seats, dome lamps, ventilators in the roof, and an exhaust heater for use in cold weather. Several rifles and revolvers are supported on convenient racks, and are kept loaded for instant action. The six port holes provided, including one opening back of the cab, give ample range to reach any point, near or distant, on all sides of the truck. An extra emergency brake is fitted inside the body operating independently of the cab controls, so that the men in the body have control over the truck in case of accident to the driver.

The body is mounted on a standard Mack chassis equipped with rubber shock insulators. It is being built for the Mack Company by the Metropolitan Body Co.

Organization of Aerial Mails in Argentina

IN order to develop the aviation branch of the Argentine Army and to provide at the same time an improved air service from the capitol to the smaller commercial centers, the Director of Aeronautic Service has suggested the establishment of an aerial mail system by co-operation between the Ministry of War and the Director General of Post Offices & Telegraphs, the Department of Commerce is advised by Vice Consul Houlahan, Buenos Aires.

The plan meets with the approval of the Ministry of War and the Postal Administration, but the latter has stipulated that the administration of the service in peace times shall be under the exclusive jurisdiction of the Post Office Department, since that branch of the government would be responsible to the public under ordinary conditions. The suggested route from Buenos Aires includes the cities of Azul, Bahia Blanca, Patagones, San Antonio Oeste, Rawson, Comodoro Rivadavia, Rio Gallegos and Ushuaia.

A joint committee is now preparing a detailed plan, including the schedule of deliveries, time of flights, mail capacity for each trip, charges, etc.

Chauffeur Bribing Hinders Car Sales in Japan

U. S. Trade Commissioner says American manufacturers should agree on fixed selling price and then uniformly get behind Japanese dealers. Many cars are represented in name only. Dealers needed outside of Tokyo. Good roads campaign has been launched.

By William I. Irvine*

CHIEF among the handicaps to the development of motor transportation is the lack of preparedness of the country.

The existing narrow, dirt roads suitable for motor traffic are few in number and comparable to the secondary roads in the United States. A national road policy has been launched which will cover a period of thirty years and involve the expenditure of 270,000,000 yen (\$135,000,000) in the six principal cities alone. The building of new highways in the country districts will be slow and very costly for the reason that their construction means the purchasing of adjacent paddy fields, and the buying and condemning of thousands of houses in the cities.

High fuel costs are another detriment to the more general use of motor vehicles, for, because of the poor roads and traffic conditions, more fuel is required for an equal mileage than in the United States. Gasoline at presents sells for 62 cents a gallon at the distributing companies, but garages generally charge 67 to 80 cents and in the smaller cities it sells for 75 to 80 cents. About 40 per cent of the fuel consumed is produced in Japan and compares favorably with the imported product. Gasoline is sold at a regulated price by all companies and it is agreed that the price must always be about 50 cents. Most of the gasoline consumed in Japan is used by motor boat and stationary engines, so that increased sales to motor vehicle owners through lower prices is no argument to fuel men.

Development of the Market

Next to poor roads the greatest obstacle to the development of the motor industry in Japan is the chauffeur evil, which is present in its most virulent form and prevents cars being sold on their merits. Motor car salesmen assiduously court the chauffeurs, because practically every car is sold on the chauffeur's decision, which is in turn influenced by the largest commission offered by the dealer.

The fault of this system cannot be laid entirely on the dealers, but must be shared by the manufacturers, who, by not making a more determined effort to fix the resale prices of their vehicles, force the distributor to follow the line of least resistance in order to get the business.

Only one motor car manufacturer has insisted on the

fixed selling price and despite all claims that this was impossible, his policy has been successful.

This is a question which American manufacturers should immediately agree on and then uniformly get behind their dealers, for left to themselves to break the evil, the dealers will be a long time doing it, if at all, during a couple of decades.

Many Makes Represented in Name Only

The limited number of responsible dealers in Japan is one of the greatest obstacles to the expansion of the use of motor vehicles. Many American manufacturers are represented in name only and not in face. There are at present barely more than a dozen responsible dealers—who represent hundreds of American and European cars. The result is that only those cars are pushed that offer the least sales resistance. With the exception of two dealers, they are all located in Tokyo—with a territory over 1600 miles in length to be covered.

There are very few branches and only one company has sub-agencies over the empire.

It is a certain conviction that more cars could be sold if the dealers would extend themselves instead of concentrating in Tokyo. It would be advisable for American manufacturers' representatives to place the agencies with a new motor selling company, backed by people in other lines of business, with a capable transportation man at the head of it. This would be far better than the present method of canvassing active motor car dealers and adding another car agency to the long list already on hand.

Business on a confirmed credit basis is generally satisfactory with Japanese dealers, as the banks are well able and willing to finance reasonable risks, relying more on the name and character of the firm than the nature of the business. It is an advantage from this phase to be connected with one of the old family firms of Japan whose activities and interests touch every ramification of the empire. European manufacturers appear to be in accord with manufacturers in the United States, by demanding cash against documents and usually on irrevocable credits.

Many manufacturers are represented by more commission houses who make no effort to push an agency beyond taking orders. Such manufacturers should immediately remove their agencies and seek for a more active dealer. Even the large family firms of Japan give the wrong impression of representation, for although they

*Trade Commissioner. Article released through courtesy of Automotive Division, Bureau of Foreign and Domestic Commerce.

are represented all over the empire, they rarely have a separate motor organization in all places and their local agents are merely order takers.

There is not an American or European car in Japan which sells for less than \$950. Although dealers are reluctant to give their figures that make up the selling price of their cars, a hypothetical case, verified by two dealers, shows that a car selling for \$1,300 in the United States, sells for about \$2,500 in Japan. The asking price is generally \$500 higher in order to make allowances for the chauffeur's commission and for the customary bargaining with the buyer. The high cost of bodies also affects the excessive price. Comparatively few cars are imported with bodies, each dealer having his own body building plant. All dealers charge excessively for bodies and still claim to be building at a loss. Many dealers agree that it would best to have a central body building plant and thus cut down the selling price of all cars as well as doing away with the unnecessary dealers' losses.

Education on the Utility of Cars Necessary

Passenger cars are still considered a luxury in Japan, and even motor trucks are considered as an unnecessary asset to a business. This can plainly be seen from the motor vehicle taxation in Tokyo, where passenger cars of over 20 hp. are taxed over \$590 per year. (See Commerce Reports, May 15, 1922, page 402.) American manufacturers may assist their representatives in fighting these high taxes by an educational campaign on the utility value of the motor car.

The car owners in Japan are far more wealthy than the average car owner in the United States, and the

ownership of a motor car is a sure sign of wealth. Thousands of Japanese with good incomes feel that they cannot afford to own a car and so they hire cars—with the result that over 40 per cent of the cars in Japan are owned by hire shops.

The Need of United Action

The present time is propitious for American manufacturers to unite their efforts and develop the Japanese automotive market. The number of dealers is few, owing to the collapse of many houses after the post-war boom had given out and it should be easy for American manufacturers to aid the dealers in organizing as an association and combine their efforts toward a reduction of taxes and assist the good roads movement. The most important step is the establishment of fixed prices on all American cars sold in Japan, thus doing away with the chauffeur evil and lowering the selling price and increasing sales.

Japan should also be divided into at least two sections with individual representatives in each one, and branch agencies all over the empire. The Japanese are nature loving people, and will suffer a great deal of inconvenience to visit the famous beauty spots of the islands and were roads suitable to motor traffic and motoring costs lowered, the market for motor cars from this source would satisfy the most ambitious exporter.

Mr. Irvine has furnished the Bureau with a revised and complete list of automotive importers and dealers in Japan, which may be secured from the Bureau of Foreign and Domestic Commerce or any of its district or co-operative offices by requesting Automotive Products—Importers and Dealers in Japan, FE 11003-B.

Hardly a Top Down



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This picture visualizes the trend toward permanent tops or closed cars which has been in evidence for the last several years. There are still numerous problems of design and production to be solved before the public demand for permanent protection can be adequately met at the proper price, but engineers and sales managers are both thinking along these lines

What Highway Transport Education Means to the Automotive Industry

Highway Education Board has made definite progress since its organization two years ago. Educational work in safety, traffic, transport, and highway economics has been forwarded. College course for transport engineers herein outlined and described.

By Roy Chapin *

TWENTY-FIVE years ago the symbol of messenger service was a boy running along the road carrying a letter. Times and the custom changed and the artist began to visualize the boy as riding a bicycle.

A few days ago the post office department of the government again broadened our concept by changing the machine pictured on the special delivery stamp from bicycle to motorcycle, and it is strikingly significant of the humdrum, everyday part which the modern agency of highway transport has come to play that the change created little or no attention.

Yet the same causes which brought about a revision of the special delivery stamp are to-day exerting a profound and far-reaching influence on the mental attitude of the nation toward transport and in no field is this disclosed in a more fascinating or in a more fundamental manner than in education.

True education seeks to tell us the meaning of those things which constitute the fabric of our daily life. At first we are content with surface impressions, but as we grow the task of the educator becomes one of searching out principles and of interpreting them to us.

Consequently, he who would best perform this duty must be constantly on the alert to discover new tendencies and movements, in order that those who are to be the citizens of the future may properly evaluate their influences and effects.

For the purposes of this article we are concerned only with that segment of progress which is highway transport, but in the advance which has been made in this field in the past ten years, we have an influence which is destined to play perhaps a larger part in the life of the nation than that occupied by any form of transport now perfected.

The development of the modern motor vehicle has brought with it a complete overturn in many of our traditional habits and customs and still we stand but at the threshold. No evolution of national import can be brought about without a concurrent change in social, legislative, physical and educational practice and the problems so brought out can only be met by a thorough and exhaustive probing into underlying facts.

Two years ago, realizing these truths as applied to the evolution of highway transport, the then United States Commissioner of Education, Dr. P. P. Claxton, called together a group of governmental, educational and industrial authorities to consider the whole problem and to see

if a reasoned program could not be worked out which would acquaint the whole public with the situation as a few leaders then saw it.

As the Commissioner saw the problem it was one which called for a revision of our entire educational program, in order that education might continue to fulfill its purpose by interpreting this phase of our everyday life to all of us. How clear his vision was is most easily determined by a review of the events which have followed:

The preliminary conference in Washington lasted two days, at the close of which those present recommended that there should be set up in Washington a permanent committee having to do with highway and highway transport education and charged with the task of compiling and distributing relevant data.

In order that the committee might be inclusive of all of the principal sources of information material, representatives were named from the Bureau of Public Roads, Bureau of Education, and the War Department, representing the national government; from the American Association of State Highway Officials, representing the states; from the Society for the Promotion of Engineering Education, representing engineering education; and from the National Automobile Chamber of Commerce, and the Rubber Association, representing industry. Later, the Society of Automotive Engineers was invited to participate as representing the technical side of industry.

A Definite Program Formulated

The next step was the formulation of a definite program, which was accomplished under the direction of Prof. C. J. Tilden of Yale University, who was granted leave of absence from that institution for the purpose.

Since that time, the committee has met at stated intervals without interruption and with a gradually broadening program which has to-day made it one of the great forces in sound highway development in the United States, not from a present-day standpoint, perhaps, but in its ability to place the problems ahead clearly and dispassionately before the educators of the country.

The story that follows, then, is a chronology of events wherein we find the committee driving steadily ahead and clearing the path of the underbrush of misunderstanding that the way of those to follow may be made easier.

It is difficult at this time to tell definitely in just what field the work has been most far-reaching. It is sufficient to say that there has been little lost motion and that all of the accomplishments are of moment, since each marks a

*President Hudson Motor Car Co.; chairman N. A. C. C. Highways Committee.

A COMMITTEE of educational experts is in charge of the program of the Highway Education Board. Extensive work has already been done along many lines, the details of which are outlined in this interesting article.

A meeting will be held in Washington, Oct. 26-28, to discuss further plans and future procedure. This big highway congress will be one of the most important ever held in the history of road building and road use.

definite advance on a course which has been but obscurely charted, if at all.

Suppose we consider first the most popular work of the committee, which has to do with safety and essays in highway transport.

The question of safety on the highways has been one of immediate concern to all. Little children were prone to stray on the roads and could not always be avoided by the most careful driver. The pedestrian has been wont to cross roads at will and the driver has not always stayed within his rights.

Here is a major problem in education which the committee realized must be met quickly and efficiently.

The National Automobile Chamber of Commerce, made up of the manufacturers of cars, set aside generous sums for the best essays by children in the grade schools on the subject of safety on the streets and roads, and awards for the best lessons in safety submitted by school teachers.

The first year's awards have been made, and so successful was the event that it will be renewed this year. Some 500,000 essays were submitted to the committee by school children in every community in the land, while teachers everywhere contributed lessons which the committee will later summarize and distribute for the information of teachers everywhere.

The result was that a tremendous impetus was given to safety discussion. Many great national publications gave liberally of their space, and educators, Government officials and others, of their time. New life was given the movement for playgrounds for children, and the effect can only be measured by the statement that, while traffic increases, the accidents per car show a decline.

Highway Transport Scholarship

The same success was obtained in the high school field through the essays on highway transport. H. S. Firestone, a member of the committee, contributed an annual scholarship worth \$4,000 for the best essay on this subject, and the event has now progressed for three successive years, each competition showing an increasing merit and understanding of the problem, each reaching out into new fields and bringing the youth of the nation to a new understanding of the fundamental problems involved, through personal study and work.

Curiously, there has been a reaction which was entirely unexpected when this phase of the committee's work was undertaken. So interested have the elementary and high school officials become that they in turn have begun to study the effects of highway transport upon education itself. Much more is known to-day about the influence of highway development upon the average attendance of the child at school than was current a brief time past. The day of the little red schoolhouse is numbered. Consolidated schools are a forecast of the future, with motor buses to carry the children back and forth. Taxes will be cut down and better facilities afforded as highways

become standardized, and the educator, recognizing this truth, is to-day an advocate of better roads.

Turning to the university field, the committee was confronted with a lack of definite outlines for instruction and with a lack of interest, due largely to the fact that no effort had been made to place the facts before the professor. Two steps were taken to meet this situation.

Wherever sufficient interest was indicated, regional conferences were held on the question of highway transport, with State and national highway officials taking a prominent part. Such meetings have been held at the universities of Pittsburgh, Michigan, Yale, Kentucky, Tennessee, Missouri and Maryland, and at the Texas Agricultural and Mechanical College. Others are now pending and a widespread interest has been generated. Some twenty institutions of more than average collegiate rank now have courses in highway engineering, which are to-day more numerous and more rationally planned than two years ago, through the co-operation of the several elements interested.

The other outstanding activity in this field has been the publication of a tentative topical outline on highway transport under the auspices of the committee by Prof. Lewis McIntyre of the University of Pittsburgh. Here all known sources of information are listed and complete lecture courses suggested for the consideration of the professor.

Outline to Be Revised

The book sprung into immediate popularity and the first edition was exhausted upon publication, educators everywhere asking for it. The work has gone into practically every civilized country, and while admittedly anything but final, has established a clear basis for future progress. It is to be revised this fall to contain many new facts which have been developed since its publication and frequent revisions will probably be necessary for a considerable time to come, so rapidly is new data being developed by the Bureau of Roads, research agencies of the colleges and others engaged in the task of searching out facts.

The success of the McIntyre outline at once brought the committee to an examination of the high school field. Here it was found that highway transport played a negligible part in instruction. Whether the course be civics, history, economics, geography, transportation or what not, the older forms of transportation were used as illustrations and highways neglected, again due simply to the rapid evolution of the latter.

So the committee has undertaken to meet this need by obtaining the services of Professor Buckner to undertake the same task in the high school field as McIntyre accomplished for the university—in other words, to translate this work into language and form suitable for consideration by high school teachers. This book, too, will be distributed.

Meanwhile, Miss Florence Fox, one of the specialists in the Bureau of Education, had become interested in this work, and as a result she has recently brought out one of the most interesting developments which has yet been seen in the whole field of highway transport education.

The story of the work is best told by a visit made by the writer to the Thompson school in Washington, where Miss Fox is demonstrating her ideas to fifth and sixth grade pupils.

It is a study in what is known as the project method of education. The pupil takes a given highway, and by tracing its course across the country learns in detail the history of the locality, the geography, and the different forms of production as well as the flora and fauna. Studying how the highway is built, he learns about civics and physical construction.

The results cannot adequately be described in the space

allotted here. It is enough to say that so interested do the boys and girls become that they take their questions home to the whole family, and days are spent in motor cars studying the highway at close range. It is an education for the parent as well as the child and a most excellent piece of work.

This object form of learning is so successful that the committee has decided that every similar opportunity should be given to university students who are studying the more fundamental courses. Accordingly, T. H. MacDonald, of the Bureau of Public Roads, has prepared a series of model exhibits which show in detail different phases of highway construction and maintenance, together with the most approved forms of culverts, underpasses, bridges, etc. Roadside treatment is handled incidentally, as are other phases, and the whole constitutes a vivid picture of highway work.

Simultaneously, Mr. Firestone has had ten exhibits prepared which show by material and pictures the process of raw rubber on its way from the plantation to its destination as the finished tire on the automobile. An elaborate textbook supplements this work, making the whole study of tremendous value.

The last link in the chain is now being worked out by the National Automobile Chamber of Commerce, under the direction of George M. Graham, who is charged with the task of getting together a similar study of the motor vehicle. This exhibit is as yet in the formative stage, but it will be one of the most complete of its type ever put together, and will represent a marked advance in work of this kind from the standpoint of the automotive industry.

These three exhibits linked up with charts, tables, textual data and films, will place an array of material at the command of the university professor which, it is anticipated, will give him a complete laboratory.

These are the outstanding accomplishments to date of the Highway and Highway Transport Education Committee or Highway Education Board, as it is to be known in the future.

They do not, however, cover the field. The contact with the National Research Council established through Dr.

"THE development of the modern motor vehicle has brought with it a complete overturn in many of our traditional habits and customs and still we stand but at the threshold.

"No evolution of national import can be brought about without a concurrent change in social, legislative, physical and educational practice and the problems so brought out can only be met by a thorough and exhaustive probing into underlying facts."

W. K. Hatt is one certain to bring large results as we turn more and more to laboratories for factual data. Highway transport films are in the making, which will seek to bring out the public interest in sound highway administration, finance and regulation. The vocational field and the training of those men already on the job is an important aspect which will form a large part of the committee's contribution in the coming year, and which has been passed over only temporarily while other problems were tackled.

The committee should and probably will have a part in the deliberations of the International Road Congress in Seville, Spain, next year.

Meanwhile, preparations are being made for the second national conference on the educational aspects of highway transport at Washington, October 26-28 of this year. At this time, it is expected that the seed sown at the meeting two years ago will spring full-flowered into existence.

It is early yet to discuss details, but a committee of educational experts is in charge of the program, and it is anticipated that the event will be by all odds the most determinative ever held in the history of road building and road use. Problems of finance are looming large. So are questions of use and administration.

The meeting of many minds presents an opportunity not for immediate solution, but for progress, and it is to that the efforts of the committee are dedicated.

Automotive Sales in Foreign Lands Increasing

IN spite of the general business depression and the lack of good roads in the Chihuahua district, the 650 passenger automobiles in use at the end of June, 1922, represent an increase of 100 per cent over the preceding year. Consul J. B. Stewart states that this notable increase is due to settled political conditions in all parts of the state and to the establishment by an American firm of the first automobile sales agency using American methods, by means of which prospective purchasers are enabled to obtain their cars without making a special trip to the United States. The sales of low-priced light motors have greatly outnumbered those of all others, but there has been a decided tendency during the past six months toward the heavier and higher-priced cars.

THE comparatively large number of motor vehicles in use in the Republic of Panama and the Canal Zone is due principally to the activities connected with the Panama Canal, and also the extensive use of motor vehicles for hire in Panama City and Colon and the ad-

jacent sections of the Canal Zone, says Consul Orr, Panama, in a report to the Department of Commerce.

MOTOR transportation of all kinds in Egypt, particularly with regard to taxicabs and commercial vehicles, received a considerable impetus during 1921. There are over 1600 passenger cars, of which 234 are taxis and 120 trucks in Alexandria, while in Cairo there are about 2200 passenger cars, of which 308 are taxis and 110 motor trucks. Motorcycles in these two cities number about 350 and 900, respectively.

THE motor car market in Shanghai is showing signs of recovery, according to dispatches from Trade Commissioner Hoyt. The representative of one of the largest automotive manufacturers in the United States has reported that late sales have been better than any time in the past eight months, which is particularly encouraging as business has been dull in all lines. The greatest demand he reports is for medium-priced passenger cars.

Who Are the Potential Truck Buyers?

A thorough analysis of the field of truck buyers and of methods of distribution form an essential basis for any truck marketing policy. Buyers consist of retailers, commercial haulers, and industrial concerns. Wide variation in distribution practice.

By Harry Tipper

COMMERCIAL vehicles are used for business purposes and the methods of buying vary greatly according to the character of the problem and the necessities of the business. If there were available thorough information regarding the number, sizes and uses of commercial vehicles in various industries, it would be possible to determine the general methods of distribution and selling of most value for these purposes. Such figures are not available in sufficient detail to serve the purpose, and in discussing this problem it is necessary to consider two points:

1. Probable buyers of commercial vehicles and their present methods of buying.
2. Present methods of distribution and their application to the buying requirements.

From these it should be possible to suggest the probable lines of most valuable development for the future extension of the commercial vehicle business. Buyers of trucks comprise all kinds of businesses, and the number of such vehicles required to meet their requirements runs all the way from one to several hundred for an individual establishment. A considerable part of the market for commercial vehicles is being supplied by the production of speed wagons in the passenger car factories, built along the lines of the passenger car with limited loads and rapid acceleration. These must be considered as commercial vehicles, however, subject to the same requirements of buying and sale as other commercial vehicles now in use. Probable buyers of commercial vehicles classify themselves as follows:

1. Retailers.

There are somewhat over a million retail stores of all kinds in this country and their relative value may be stated as follows:

Approximately one-third of the retailers are without sufficient working capital—provide no profit beyond a living for the owner, and have small delivery requirements.

Approximately one-third are sound but small, do a fair business but return a net income too small to be taxable.

This market represents the one wagon market for commercial vehicles except in the large cities, where approximately 50-60 per cent of this class do not use delivery equipment. Approximately 30-33 per cent of the retail establishments represent the possible customers for one vehicle or more, and approximately 10 per cent of the entire field have large delivery requirements demanding a fleet of five or more commercial vehicles of all kinds.

These establishments range all the way from dry goods stores, florists, jewelers, and other package stores to coal, mill supplies, builders' supplies, and contractors' supplies, with their varying requirements as to size, speed and character of vehicle required.

2. Commercial haulage concerns.

A large number of these concerns are local express, storage warehouse, moving, cartage, etc., concerns. The number of large concerns in this field is comparatively small; only two or three thousand probably in the whole country, although the actual number of concerns engaged in express, storage, moving and cartage, runs ten to fifteen times that number. In this case the purpose of the equipment demands heavier vehicles capable of taking large loads and withstanding many severe conditions of service. Even if the moving concern in a comparatively small town needs only two or three vehicles, it requires them of sufficient size to answer the usual custom of a load size of household goods or packages. Small vehicles of limited capacity, such as speed wagons of one ton and under, have their place in this field. They are valuable, however, only in the delivery of local express packages where there are a number of small dumps. They do not serve the purpose in the larger haulage from warehouse to railroad and from warehouse to warehouse which is required for a large part of the movement of their product by commercial haulage concerns in the trading area of any city or town.

THE other phase of commercial haulage takes into account inter-city haulage, or haulage from one manufacturing or trading area to another. The statistics in relation to the amount of business done along these lines are very fragmentary and it is not possible to determine the number of jobs required. However, the type of vehicle demanded for this purpose is obviously the type permitting a maximum load carrying capacity, with a good rate of speed, taking in from 2½ to 5 or 7-ton jobs, and demanding the possession of a number of vehicles in order that the haulage may pay.

There is one very important difference between the requirement of the retailer for delivery purposes and the requirement of the haulage company. To the retailer the delivery is a subsidiary part of his business, and his principal interest is to provide frequent and reliable delivery service, so that he will be able to give his customers proper attention in this respect. The haulage in itself is not a problem of his, and he is not interested either in types of vehicles or problems of delivery except as they affect his competitive situation as a retailer. The commercial haulage company, however, makes its money out

of its haulage equipment. Its whole problem is one of haulage and the entire approach to the question is a different one.

THE third section of importance in the market to be considered is that section occupied by various lines of industry in connection with the road haulage problems attached to these industrial concerns. In the lumber or oil—certain portions of the metal trades fields—in shipping industry, and in various other lines of endeavor, the industry requirements themselves include road haulage problems which must be solved in the best possible manner and more and more require the use of commercial vehicles in order to aid in their solution.

The problems in these various industries are entirely different and, in some cases in the same industry, they are entirely different. The problem of providing trucks for use in the oil fields is an entirely different one from the problem of providing suitable vehicles for the delivery of oil from the local distributing station to the retailer. Similarly, in the lumber field the problem of hauling lumber to the mill cannot be answered in the same terms as the problem of hauling lumber from the dealer's place to the building site or other point of construction. For this reason we have divided the industrial problem from the retailing problem, although in some cases the buyers are represented by the same organizations. In the oil business, for instance, the same company may be engaged in

the production and refining and distribution of oil and also concerned with all the problems of haulage connected with the business. These problems themselves, however, are different and are usually in the hands of different men, so that they must be attacked as though they were separate marketing elements.

The methods of distribution at present employed in the truck field in the marketing of trucks, take in the following elements:

1. Truck sales from the manufacturer to the buyer.
2. Sales through factory branches.
3. Sales through exclusive truck dealers.
4. Sales through retailers of automotive equipment who are not exclusively concerned with trucks themselves.

It is obvious that the value of these different methods of distribution depends upon the relative importance of the various markets and the accustomed methods of buying in these markets. This part of the subject cannot be treated without extending the article beyond the requirements of the present discussion, and it will be taken up in a future article dealing with this part of the subject.

IT is obvious, however, that no one method of distribution will serve the purpose and that some two or three methods must be combined in order to reach the various markets involved in the use of commercial vehicles and do this effectively in the consideration of their buying habits.

Sales Possibilities in Brazil Increasing Steadily

INCREASING sales of automobiles in Brazil are being reported by the customs authorities, according to a report just made on the automobile industry in that country to the U. S. Bureau of Foreign and Domestic Commerce. The American-made automobile is well thought of.

Despite a very unfavorable exchange rate and general financial depression, the automobile market opened up at the beginning of this year in a much better position than 1920 and has continued to improve. The unusual slump which the Brazilian automobile market experienced during 1921 was brought on by a combination of circumstances, the chief of which were the exceptionally low value of the milreis and the general commercial depression. With the general reduction in prices of American cars and a corresponding improvement in Brazilian exchange and business conditions, the market to-day in Brazil for American automobiles is steadily improving.

Increasing automobile and truck sales in Brazil at the present time indicate that the market is on the high road to recovery. Representatives of American truck manufacturers who have recently investigated this market in Brazil express themselves as being highly pleased with the prospects for increased business.

Generally speaking, the American automobile and truck are given preference over European makes, as witnessed by enormous increases in American sales. This preference will not continue to exist unless the same kind of thought and energy is put into our sales methods and serve after sales have been effected. The American manufacturer is warned that when the sale is consummated he must not let his interest wane in the future of his product.

Light, medium-priced touring cars, roadsters and sedans are preferred for the most part. The lighter type of truck is also more popular. While the cheaper makes of cars are preferred, there is a tendency among the richer Brazilians to buy very expensive cars for quite the same reasons which prompt Americans to purchase them when they can be afforded.

Judging from the experiences of some American automobile manufacturers during past years in Brazil, and especially in 1921, it would seem that it is a mistake to place an automobile representation with a firm—whether American or foreign—which is doing general importing. It should not and does not necessarily work out detrimentally to a manufacturer, but in all too many instances this is the case.

Regardless of the popularity of a given make of automobile in the United States, and notwithstanding its excellence in design, workmanship and endurance and dozens of other good qualities, if turned over to poor representatives not so well equipped, will suffer greatly from this severe competition.

The Brazilian is a great taxi rider. Fares are lower despite the fact that gasoline in Brazil is much higher. Cars rent there at approximately \$2 an hour.

ONE obstacle in the greater distribution of American cars in Brazil is the stringent credit arrangements forced upon the dealers and jobbers in Brazil. "While shipping cars out on consignment is not to be advocated, it does seem that it would be more advantageous to both the automobile manufacturers and dealers to allow from 60 to 90 days credit, allowing time for a turnover and making it possible for dealers to have a few cars in stock. This is one of the outstanding advantages which a large American corporation with branch offices in Brazil has over similar manufacturers with only local representatives or dealers.

Efforts have been made from time to time to promote an automobile show in Rio de Janeiro or Sao Paulo, but always without success. The approaching Brazilian Centennial will offer an excellent opportunity for American automobile manufacturers to display their cars in the American Industrial Exhibits Building, it is suggested. Several American companies have already arranged for exhibits.

AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

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Oaks and Acorns

PRODUCTION progress in the automotive industry probably will be largely a matter of details and refinements in the future. Major changes of vast import have been made during the last decade. Such large individual changes are not so likely to occur in the future.

A careful study and readjustment of numerous details of production, however, will continue to take place. The accumulation of efficiency arising from the innumerable minor improvements may result in a production system as superior to the present system as the present is to the past. But the change will come through a consideration of details rather than through major readjustments.

An outsider going into almost any up-to-date, normally efficient automotive plant will see many odds and ends of the production system that apparently could be altered to advantage. The production manager himself is usually aware of these,

but he has been involved, of necessity, in larger improvements and has not yet come to a detailed study of these smaller elements.

Automotive production costs will continue to be lowered for many years to come. Production managers are finding it more and more worth while to take care of these small items. They are finding that these small factors, when added together, constitute waste or saving possibilities which mount into many thousands of dollars. The production manager of the future who is too big for these small things will be behind rather than in front of the procession.

Promotion as an Incentive

THE average worker desires to make financial progress from time to time. Since habit and inertia play a large part in human action, however, he would rather make that progress in the organization with which he is already employed. He will not change his place of employment unless he believes he can do better elsewhere.

Thus the factory which makes it possible for its workers to advance from time to time is likely to keep its experienced workers and thus increase its working efficiency. Incentive of this kind can be applied in several ways. The Franklin factory, for example, has recently installed a promotion system whereby old employees automatically move up to fill any vacancy and new employees from the outside start at the bottom of the ladder. All of the jobs in the factory have been classified for this purpose and charts are being posted so that the employees may see what their next step in advance will be.

It is assumed that in working out this system the test of merit as well as that of seniority will be applied.

Viewed broadly, the policy of promotion from within is a sound one, as it does give real incentive to the men already on the job. This applies both in office and shop, perhaps more in the former than in the latter. The objection has been made, of course, that such a policy tends toward inbreeding and ingrowing ideas; that fresh ideas and points of view coming with new men to the organization from time to time are highly beneficial. While there is something in this, it is to be recognized that ingrowing ideas are rather a matter of men than of environment.

Quantity and Quality

THERE is nothing inherent in quantity production methods that renders maximum quality impossible to attain. Efficient methods need have nothing in common with low quality. This is not always recognized in discussions about the relative merits of American and European cars. High production and lower quality are too commonly thought to go together, simply because some of America's cheap cars are not comparable in quality to the hand made—and high priced—European jobs.

Care in inspection and precision in operation will turn out in quantity a product equal in quality with any made in smaller lots. In fact, the repetition of

the same precision operation many times over tends toward greater rather than less accuracy and quality.

Quality varies with precision of manufacture and care of inspection, but has no inherent relation to the quantity produced. This is a fact that American exporters will do well to impress upon foreign dealers and prospective foreign buyers.

Railroads Plus Trucks

THE development of motor transport will come because, and insofar as, it fills an economic need. It has certain obvious limitations. It will not replace all other forms of transportation. In some cases it may replace, but in more cases it will assist and extend existing transport mediums.

The forward-looking men in the railroad and electric railway field recognize this fact clearly, as do most of those interested in the promotion of highway transport.

Elisha Lee, vice-president of the Pennsylvania Railroad, for example, expressed his opinion of highway transport recently like this:

"Personally, I do not subscribe to these views. The importance and value of commercial motor transport to the country as a whole will not lie in menacing or injuring the railroads, but in the extent to which it is capable of aiding them to greater usefulness by assisting in the improvement of their indispensable public service and in the solution of their problems of operation and earnings."

This is the sort of thinking which will enable the public to get maximum transportation efficiency and economy regardless of the medium. The problem is one which is most likely to be solved through constructive co-operation.

"The Greatest Show on Earth"

IT sometimes seems as though the automobile industry chooses its least accurate and most highly superlative writers to prepare the statements about individual products for public consumption. Careful consideration of the automobile advertising in nearly any popular magazine indicates that nearly every car on the market is the finest, runs the most smoothly, operates most economically, is the most powerful.

The affect upon the casual reader of such an array of superlatives is not likely to be specially favorable. It is evident that "somebody lied." They can't all be the best.

Along the same line is the practice, both within the industry and from the industry to the public, of slightly perverting the statements of prominent individuals or institutions for publicity purposes. One parts maker almost lost an important customer recently by using for publicity purposes statements made privately about the product by the customer. Another automotive company is accused by a scientific institution of attributing to that institution statements which it never made in the form used.

Comparatively speaking, the automobile industry is young. It has the advantages of youth—and some of

the faults. Conservatism in youth is often more impressive than over-enthusiasm. Automotive advertising and publicity will increase in effectiveness as it increases in accuracy and decreases in superlatives.

Answering Foreign Inquiries

CAR and truck manufacturers can materially increase their foreign sales by having greater consideration of the "other fellow" in their foreign correspondence. Friendliness is always the basis of better business, and courtesy and service are the basis of business friendliness.

In handling foreign inquiries the American manufacturer should go more than half way in trying to accommodate his prospective customer. This can be done without incurring any financial expense. If the letter writer puts himself in the place of the foreign buyer, he will write a far different letter than when he simply considers foreign correspondence in the same category as domestic.

Many things that are clear and obvious to a domestic inquirer are entirely unknown to the foreigner. It should be remembered that in many cases the foreign inquirer has no more knowledge of you than you have of him. The fact that you know all about yourself is no sign that he knows the same things.

Misunderstandings always arise more readily through correspondence than through personal contact. They can readily be avoided, however, by a little intelligent effort. Foreign correspondence can easily be made a real builder of sales.

Air Mail Proves Reliability

WE are getting so used to saying that America is far behind in the development of civil aviation, that we frequently fail to give proper attention to the achievements which have been made. The figures recently published concerning the past twelve months of aerial mail service give a striking record of accomplishment.

The entire automotive industry has been conscious of the presence of this service, but its real scope and accomplishments are scarcely recognized. The figures given are for the fiscal year ending July 1, 1922.

The planes in mail service covered 1,750,000 miles and carried 49,000,000 letters. This mail totaled 1,224,500 pounds.

92.5 per cent of the trips scheduled were actually completed and 94 per cent of the scheduled mileage was actually flown. This is a record for reliability to which any commercial transportation medium might point with pride.

The air mail service is of interest to the automotive industry, chiefly as an experimental route of civil aviation. Its record for the past year indicates the regularity and safety with which a service of this kind can be operated in the United States, given proper organization and careful supervision. It is unfortunate that the cost figures available for operating this service are such as to be of little use for commercial comparison, because certain important factors of commercial operating costs are omitted.

Rest of Year Holds Out Good Prospects

Effects of Railroad Strike Alone Would Prove Retarding Factor

NEW YORK, Aug. 17.—The inconsistency of the Government's coal priority ruling classing the automotive industry as non-essential, on the one hand, and of a public demand for motor transportation which is speeding up motor truck production, on the other, is causing a feeling of indignation among automotive manufacturers which may reach the stage of formal protest against the priority order if the threatened coal shortage becomes actual through a continuance of the railroad strike.

No Curtailment Yet

So far no curtailment of automobile, truck or parts production has been necessary, as day to day receipts of coal in the Detroit district, heart of the industry, have maintained the situation just about where it was two weeks ago. But with rapidly gaining demands for trucks and in some cases for passenger cars to do the work of partially crippled railroad lines again emphasizing the utilitarian character of the industry, its leaders naturally are chafing under the non-essential label.

With the electric power company in Detroit making no discrimination against the automotive industry or any other class of users and with coal in small quantities but steadily reaching the district, production is showing no more than a seasonal decline from the record-making figures of May, June and July.

Agricultural Sections Buying

Reports from various sections of the country show a logical mid-summer stagnation of passenger car sales in the larger industrial and mercantile cities, but buying is gaining in the agricultural sections. Indications are strong that unless a continuance of the railroad difficulty adversely affects general business conditions the country's automobile makers and merchants will have a fall and early winter business vigorously holding its own on a basis of seasonal comparison, with the huge sales of the spring and summer.

The price reduction flurry apparently is all over. With one or two exceptions lowered prices were confined to the big production field. One or two makers have slightly increased their prices. Generally, indications

Business in Brief

Although the end of the strikes seem near, uncertainty as to when the skies will definitely clear has been such as to have an effect upon current trade and industry. Coal priorities may hit some of the industries like iron and steel and there promises to be a car shortage when the crop movement enlarges this fall. A quick pickup, therefore, is not expected.

This is borne out by the slowing up of collections and spotty crop conditions, this being noticeable in cotton in Texas, the lower Mississippi valley and Georgia. Corn has suffered somewhat in the Northwest and the middle Ohio valley because of the lack of rain.

In wholesale trade the immediate future is producing mainly small orders, but purchases for next spring show confidence that is cheering. In the East shoes are holding up, but in the West business is slower. Uncertain raw cotton prices have slowed staple cotton goods buying, but activity among New York jobbers has helped the situation. Woolen mills are selling well for spring delivery.

Hot weather hit retail trade and the strikes have left thousands without employment, which slowed buying.

Fuel shortage continues to hamper industry and there promises to be further reductions in the number of iron furnaces in blast and of the capacity of steel works. Prices of scrap material, pig iron and finished steel continue to advance. The increase of coal production is noticeable, with available coal reported to be easing in price in the West. Coke is \$3 under the peak price of 1920.

If anything, the stock market is stronger, caused by promise of the strike settlement, bonds continuing steady. Money, too, remains easy, with bank clearings at forty-two cities showing a gain of 4.8 per cent over last week and of 14 per cent over the same week a year ago. The aggregate was \$6,381,631,000.

Car loadings for the last five weeks showed 4,151,434 cars loaded on the railroads as against 4,212,171 cars in the preceding five weeks. A year ago the wheat movement was heavy, but despite this the present August movement was 9.6 per cent better.

confirm the earlier forecast that manufacturers whose quantity production justified lower prices without sacrificing fair profits have set their lists for the remainder of the year

(Continued on page 397)

Public Given Chance, Buys Timken Stock

Shares Sold Number 400,000— Offering Heavily Over- Subscribed

NEW YORK, Aug. 23.—Decision on the part of the members of the Timken family, sole owners of the Timken Roller Bearing Co., to give the public an opportunity to buy into its ownership, was followed by immediate action on the part of investors, who responded to the offer by heavily oversubscribing the stock offering of 400,000 shares, which represent one-third of the holdings of the family and which are valued at \$12,000,000, according to the statement issued to-day by Hornblower & Weeks, head of the banking syndicate which made the offering.

No Change in Policy

Application will be made to list the new shares on the New York Stock Exchange.

The stock readjustment now under way provides for 1,200,000 shares of common stock, including 400,000 now offered to the public. The authorized capitalization is 1,250,000 shares.

A statement made by H. H. Timken, president of the company, in connection with the stock issue shows net profits of the company, after taxes and depreciation charges, as follows:

	After Taxes
1915.....	\$4,671,710
1916.....	6,184,786
1917.....	2,453,177
1918.....	1,821,933
1919.....	4,778,115
1920.....	2,449,147
1921.....	2,275,549
Average	\$3,519,201
6 mos. 1922.....	4,095,630

Company's Balance Sheet

The Timken balance sheet as of June 30, last, shows current assets of \$10,308,493; permanent assets, including land, plant, etc., \$9,953,654, minus an allowance of \$3,670,593 for depreciation, amortization, etc.; other assets, including additional real estate, investments, accrued interest, etc., \$2,013,353; prepaid insurance, miscellaneous supplies, etc., \$111,618, making total assets of \$18,716,156. Liabilities include \$1,291,267 in current liabilities and \$2,350,000 in reserves. Under nominal assets the company lists declared capital at \$6,000,000 and surplus at \$9,074,889.

Net profits available for dividends (after taxes and depreciation) are estimated by the company at \$6,000,000 for 1922.

It is the policy of the company to start dividends on the new stock on a basis of \$3 per share.

There will be no additional members of the board of directors and no change is planned in policy or management, it is stated.

Maxwell May Obtain Title to Chalmers

Proposed Plan Must Be Ratified
by 90 Per Cent of Latter's
Bondholders

DETROIT, Aug. 21—President W. R. Wilson of the Maxwell Motor Corp. and Chalmers Motor Co. said to-day that a basis had been arrived at between the bondholders committee of the Chalmers company and representatives of the Maxwell company for an exchange of bonds outstanding of the Chalmers company for class A and B stock of the Maxwell corporation. If the plan is ratified by 90 per cent of the Chalmers bondholders, it will become effective and Maxwell will take title to the Chalmers company.

Wilson declined to give any details of the plan at this time, as he said it would be withdrawn if the consent of the required number of bondholders was not obtained. It is expected that action will be taken this week.

With the consent obtained, steps would be taken at once toward refunding the Chalmers organization and placing it in a satisfactory financial position.

An outline of the production possibilities of the Chalmers company has been drafted through to next July, and with the financing plan effective, producing would be started upon the scale outlined. This is considerably larger than production now, which has been held to a point which Wilson determined was consistent with its financial position.

Much larger production, he said, was warranted by the demand for the car, but it was financially unable to extend its operations. The material inventory at the plant has been practically worked off, Wilson said, and purchases are being made to meet manufacturing requirements until the future operation of the plant has been determined. The reduced prices announced this month has brought a large increase in business which the company has been unable to meet because of its financial condition.

Cass G. Selden Elected Joseph N. Smith Co. Head

DETROIT, Aug. 21—Changes in the officers and board of directors of the Joseph N. Smith Co., manufacturer of body hardware, have resulted in the election of Cass G. Selden as president and general manager; A. R. MacCorquodale, vice-president; Robert Dittenhaver, secretary and treasurer, and H. P. Fry, assistant secretary and treasurer. The directors include the three first named officers and J. W. Watling, George Rumford, C. B. Chamberlain and Edward Claxton.

Dittenhaver had been connected with the General Motors for 15 years in a financial capacity, having been secretary and treasurer of the Scripps-Booth division until it was discontinued. No

Metropolitan Districts Will Provide Most Business for Rest of Year

By W. R. Wilson

President of Maxwell Motor Corp. and Chalmers Motor Co.

Detroit, Aug. 21.

Indications are that there will be a continuance of steady business in the automotive industry throughout the balance of the year unless there are unfortunate complications due to the coal and railroad strikes. Without tieups in material or coal supplies, the industry should go ahead manufacturing at close to capacity throughout the year.

Most of the business in the fall and winter months will come from the Metropolitan districts, I am convinced, with a betterment in the general farm market, but not a real buying movement from this source this year. The banks will get the larger part of anything the farmer may realize on his crops this year and will be inclined to frown upon automotive purchases at this time. Until the banks have been provided for, the farmer will not come into the automotive market extensively but there will be more activity in farming districts this year than for some time.

In the event that the railroads are unable to move immediately the crops that the farmer has been blessed with this year, I believe the holding over of them will increase their value and give the farmer a higher price when they are moved. The holding of them will not give the farmer money to come into the market this fall but in my opinion he would not be a large buyer this year anyhow.

Traffic conditions to date, while causing delays in getting material into the factories, have not had the effect of slowing down production. We do not anticipate much trouble from this source as we know the railroads are desirous of holding the good will of the industry because of the large amount of profitable business that it affords them. It is necessary that the traffic departments of the factories work harder than in ordinary times, but they will find the railroads ready to cooperate in every way they can.

We find that the railroads are doing effective work in making coal deliveries, not in quantities as large as we would like to get but nevertheless in quantities sufficient to meet requirements. It is necessary for the railroads first to have sufficient fuel for their own requirements, but they are making every effort to get to the industry the coal it has contracted for.

Freight cars for shipping automobiles are somewhat scarcer than formerly but we are getting enough for our requirements and the boat service is effective in moving large numbers of cars in the lakes district.

changes in the manufacturing policy will be made, Dittenhaver said, except that the company will aim at the standardization of its products and will concentrate in the future upon the manufacture of automobile body hardware.

The financial condition of the company was declared to be excellent, and business during the first six months of the present fiscal year shows a large increase over the same period a year ago.

H. P. Williams has been appointed sales manager of the company, one of a series of promotions in his 13 years of uninterrupted service with the company, during which he has been identified with practically all departments.

PLANS RIM FACTORY

ATLANTA, Aug. 21—The American Wheel & Rim Co., organized here a few days ago with \$650,000 capital, is planning the establishment of a factory before the end of the year for the manufacture of automobile wheels and rims. A new type rim recently invented by James W. Cordell, who is one of the organizers of the company, will be the principal product. R. H. Lukenbill of Atlanta is associated with Cordell in the enterprise.

Richard F. Kelsey Dies; Old "Automobile" Editor

NEW YORK, Aug. 21—Death has claimed Richard F. Kelsey, for many years a prominent figure in bicycle racing circles and at one time editor of the *Automobile*, now *Automotive Industries*. Kelsey died at his home in Montclair, N. J., following a stroke of apoplexy. He was 61 years old and leaves a widow and married daughter.

Since 1903 he had been chairman of the racing board of the National Cycling Association, which took over the control of racing from the old League of American Wheelmen. At the time of his death he was connected with *Motorcycling and Bicycling* of Chicago. Originally he came from Buffalo, where he was the first president of the Buffalo Ramblers Cycling Club, one of the most powerful organizations of wheeling days.

TIRE STOCKHOLDERS ACT

AKRON, Aug. 21—Stockholders of the Liberty Tire Corp. of Carey, Ohio, have applied to the Federal Court of Toledo to have the company adjudged bankrupt. The proceedings follow receivership action at Carey, in which A. H. Schwartz was named receiver a few days ago.

Strike Settlement Heartens Milwaukee

End of Rail Trouble Awaited— Production Moves Forward at Increasing Rate

MILWAUKEE, Aug. 21—More men were employed in the automotive industries as a whole in Milwaukee county at the middle of August than at any time in two years past, according to authenticated figures. There have been some declines in the number employed in certain lines, while others have increased, which has worked to more than offset any losses. According to indications at present, new men will be taken on right along to handle business developing.

Virtual settlement of the coal strike has heartened the industries here, which are dependent largely upon fuel mined in Ohio and Pennsylvania and brought from Lake Erie ports to Milwaukee, which also is the main distributing center for the entire northwest. The railroad strike has been a collateral trouble, the solution of which alone will bring about a feeling of ease in the minds of all manufacturers here. The two strikes have been about the only serious check to the forward march which business is making, automotive and otherwise.

Trucks Make Gains

Passenger car production in this territory is going forward on an increasing scale. Makers of engines, frames, transmissions, steering gears, axles, etc., are finding it difficult to keep pace with shipping directions. The same is true of manufacturers of automotive equipment, both for car manufacturers and the jobbing trade.

The truck industry is making steady gains, due largely to the remarkable stimulation which the motorbus is experiencing in this and other parts of the United States because of the railroad strike and resentment against wartime fares charged by street railway lines and the increasing demand for more flexible and rapid urban and interurban transit. Freight trucks are making some gains but business is not yet on a satisfactory basis.

Tractor and trailer builders report a slowly improving condition of demand, with prospects for fall trade in tractors the brightest since the spring of 1920. Trailers are forging ahead under the stimulus of a demand for larger freight carrying capacity from existing or new truck equipment by utilization of a maximum of power gainable through the trailer.

Closed Car Demand Heavy

While reports of retail trade following the formal announcements of 1923 models and new prices are conflicting, on the whole dealer trade has undergone a very respectable stimulation in the past week especially. As a rule those who have not felt this betterment in demand are deal-

USE RADIO-TELEPHONY TO INCLUDE TWO CARS

RACINE, WIS., Aug. 21—Incident to the various spectacular activities in exploiting the new "F-50" motor, the Mitchell Motors Co., Inc., has successfully experimented along a new line, namely, the application of radio-telephony to mobile motor cars. Starting with a single car, one of the "White Streaks" now running in various parts of the country, which was equipped with a three-tube amplifier, which gave street corner concerts and provided other forms of entertainment, the idea met with such instantaneous response that it has been developed to embrace a pair of cars.

C. P. Robinson, during the war an expert radio operator, conceived the idea of inter-car wireless communication. By adding a microphone to each radio outfit he was able to build up individual sending stations, each able to transmit messages over distances ranging from one to two miles. The apparatus is rugged enough to withstand the hazards of all ordinary road travel and the occupants of the two cars are able to carry on an uninterrupted conversation within the distance limit.

ers representing cars that have not been reduced.

A good many people who did not buy passenger cars last spring during the big rush find eminent satisfaction in new models and prices and are beginning to place orders. Trade, however, probably will not get into a real swing until dealers are better able to place cars into the
(Continued on page 397)

Rufus S. Cole Heads Stephens in New York

NEW YORK, Aug. 21—The formation of the Stephens New York Motor Co. marks a change in representation of the Stephens in the Metropolitan district. An entirely new company has been formed and new quarters opened at 1853 Broadway, of which Rufus S. Cole is president.

In taking up this agency Cole retires from the exporting house, the Robertson-Cole Co., with which he was identified for six years. Previous to that time he was oriental sales manager for the Hupmobile. His long experience in the exporting business caused President Peek of the Stephens to ask him to take over the foreign representation of this car in addition to the Metropolitan territory.

J. Fred Hunter will continue to represent the Stephens factory in this territory as district manager. A. J. Higgins, former Metropolitan distributor for the Stephens, has become a sub-agent for Maxwell.

Barley Will Market New Car in 30 Days

Light Six Not to Be Called Roamer—New Company Succeeds Old

KALAMAZOO, MICH., Aug. 21—confirming the announcement of two weeks ago to the Kalamazoo Exchange Club of a new light six to be made by the Roamer organization, but which will not be known by the name "Roamer," President A. C. Barley states that the new models will be on the market in 30 days. At the outset the line will consist of a five-passenger phaeton, a five-passenger sedan and a five-passenger touring sedan. Later a coupe model probably will be added.

The car will be equipped with a new type of Continental Red Seal engine. The wheelbase is to be 115 inches. Prices will be set when the first shipments are made, or about Sept. 20.

Develop New Taxicab

Barley also announces the development of a new taxicab. It will be regular production in the future.

Roamer models will be continued as in the past. New closed models will be on the streets in the near future. They will carry the new 12-XD Continental engines. Duesenberg engines will be used in certain specified types of Roamers.

Barley reports that orders for the new Light Six and Roamers are coming in rapidly, and that the production for next season for the local plants should be well in excess of 2000 cars, all models included.

Announce Bond Issue

In connection with the manufacture of the new car, announcement is made of an issue of \$300,000 first mortgage real estate gold bonds, paying 7½ per cent interest and maturing in three to ten years. Olmsted & Mulhall of Kalamazoo and Corrigan, Hilliker & Corrigan of Grand Rapids participated in underwriting the issue. The Grand Rapids Trust Co. is trustee. This issue is guaranteed by the Roamer Motor Car Co., which has just been incorporated as successor to the Barley Motor Car Co. The capital stock consists of \$500,000 7 per cent preferred stock and 100,000 shares of no par value common stock.

Stock in Treasury

All the \$500,000 preferred stock and 500,000 shares of common are in the treasury and will be available for further financing, should the business expand to such a point that it will need additional capital.

The bond issue provides for the retirement of an issue outstanding on the plant of the Kalamazoo Realty Co. and originally placed on the plant by the States Motor Car Co., which formerly owned the property.

Organize Company to Attract Fokker

Business Men of Milwaukee Incorporate American Airway Transport Co.

MILWAUKEE, Aug. 21—As the next formal step in the campaign of Milwaukee manufacturers and other business men to induce A. H. G. Fokker, the Dutch aircraft designer and builder to locate his proposed new American works here, the American Airway Transport Co. of Milwaukee has been incorporated in Wisconsin with a capital stock of \$100,000.

This represents a fund raised by voluntary subscription by 200 business men to make a complete survey of the country, both with respect to manufacturing facilities and commercial transit possibilities. The establishment of the new American Fokker industry is to be accompanied by the organization of a great system of passenger and express transportation by air which will support the industry.

The incorporators of the Airway company are Clarence R. Falk, vice-president of the Falk Corp.; T. C. Hatton, chief engineer, Milwaukee Sewerage Commission; E. M. McMahon and Fritz Cremer, personal representative of Fokker in this country.

Offices have been opened in the Metropolitan Block, jointly with the new American office of the Netherlands Aircraft Manufacturing Co.-Fokker of Amsterdam, and are in charge of Cremer. F. W. Walker is director of the survey, which will take about six months' time.

On the basis of results the proposed investment of approximately \$5,000,000 is dependent. Business men throughout Wisconsin and in some of the largest cities of the country are becoming interested in the enterprise.

Appeals Court Affirms Sentence Given Pandolfo

CHICAGO, Aug. 22—The United States Circuit Court of Appeals has affirmed the sentence in the penitentiary and a fine of \$4,000 imposed on Samuel C. Pandolfo, formerly head of the Pan Motor Co. of St. Cloud, Minn., who was convicted on a charge of using the mails to defraud.

The sale of stock through the mails was the basis of the prosecution, it being charged that Pandolfo had represented that the company had assets of \$2,000,000 and that tractors actually were being built and sold. More than \$1,000,000 was alleged to have been realized by stock sales.

FARM EQUIPMENT PROGRAM

CHICAGO, Aug. 20—Preliminary announcement of the program of the convention of the National Association of Farm Equipment Manufacturers, which

FRANKLIN PLAN GIVES EMPLOYEES ADVANTAGE

SYRACUSE, N. Y., Aug. 21—Under a new system put into effect in the factory of the H. H. Franklin Manufacturing Co., promotion practically is guaranteed to every man in the shop. The plan, which is now operative in the machine shops and the wood shop, provide that vacancies, as they occur, shall be filled not by new men but through advancement of old employees.

All operations have been classified and charted according to the skill required. Charts have been placed in all departments where the new classification is now effective, so that the men can see for themselves just where they stand in the scale of advancement and just what the next step forward is.

Other things being equal, the priority of service rule will continue, the man with the greater length of service receiving recognition ahead of the man who has not been employed so long.

is to be held at the Congress Hotel, Oct. 18, 19 and 20, states that the discussion will include such subjects as "Present and Future of the Implement Industry," "Transportation Situation from the Shipper's Viewpoint," "The National Institute of Progressive Farming" and "Depreciation."

Federal Policy Opposed by Aeronautical Chamber

NEW YORK, Aug. 21—At a special meeting of the Aeronautical Chamber of Commerce a resolution was passed protesting against the policy of the government in placing orders for the manufacture of aeronautical equipment and supplies in shops owned and operated by the government. The chamber also was disturbed over the report that the federal authorities are contemplating the purchase abroad of equipment in quantity.

It is contended that this policy does not encourage the development of the civilian aircraft industry of the United States, and that it is not in keeping with "the clearly defined wish of Congress as expressed and emphasized by that body at the time appropriations for the procurement of aircraft were made."

The chamber has decided to increase the number of governors from eleven to fifteen and has re-elected all of the old board.

JEFFERSON RECEIVERSHIP

JEFFERSON, WIS., Aug. 21—Upon petition of creditors, the Jefferson Rubber Co., manufacturing tires, tubes and other rubber goods, has been placed in the hands of a receiver. A. C. Ehlman has been named receiver. It is stated in the petition that of \$75,000 in assets, not more than 50 per cent is collectible.

Chicago "L" to Use Buses in Its System

**Forty May Be Required When
Service Is Developed—
Will Be Feeders**

CHICAGO, Aug. 21—Plans for the operation of buses to supplement its electric railway service are announced by the Chicago Elevated lines. This step involves a recognition by the management of the elevated lines of the utility and convenience of the bus for passenger transportation, so capably demonstrated during the recent strike on the street and elevated railway lines, and indicates a determination to take advantage of the bus as a feeder for the electric lines.

Three bus lines are proposed for the inauguration of the service and to begin with 14 buses will be operated on these routes. The bus routes begin at the end of three elevated lines and extend from one to two and a half miles through well populated districts.

Bus Lines Integral with "L"

The bus lines will be an integral part of the elevated service available to the passengers without extra fare. Transfers will be issued from buses to electric trains or from trains to buses.

It is estimated that probably 40 buses will be required when the service is fully developed. The company expects to use buses seating about 25 passengers, lighted and heated by electricity. Formal application has been made to the Illinois Commerce Commission and to the city authorities for permission and license to operate the buses.

Winther Plant Will Build Rail Coach for Russell Co.

KENOSHA, WIS., Aug. 21—A. M. Russell, formerly of the Packard and Locomobile, has organized the Russell Co. to manufacture automotive railway equipment. The new concern has made a contract with the Winther Motors Co., Kenosha, for production. It is said to have approximately \$1,000,000 worth of orders in hand and prospects of several times that amount of business.

The Russell gas-motor coach is now undergoing exhaustive experiments under practical working conditions on a number of leading steam railway systems, notably the Pennsylvania, New York, New Haven & Hartford and others. The first coach was built at the Winther plant several months ago and other demonstration models have since been constructed. The Maryland & Pennsylvania has purchased one of the cars for service between Baltimore and Belair. It will be delivered about Oct. 1.

It has been emphasized to the people of Kenosha that the Russell company is not seeking a bonus nor will it attempt to market stock locally, since the industry has been well-financed by eastern capital on its showing.

Star Distributors Take Year's Output

Plant at Lansing Will Make Start on Manufacturing Next Month

DETROIT, Aug. 18—Contracts signed with distributors this week will take practically the entire output of Star cars by the Durant factory, Lansing, for the entire year of 1923, according to a statement issued by factory officials following a two days sales session. The Lansing plant will manufacture Stars for the entire territory between the Alleghenies and the Rockies. Its capacity is 400 cars daily.

A start on the manufacture of the Star will be made at the Lansing plant on Sept. 15, but it is not expected to get into capacity operation much before the first of the year. Two assembly tracks are now completed, and there remains only the installation of minor machinery. Delays in material and parts shipments will hold back operations temporarily, officials said, but this situation will be overcome rapidly.

Carroll Downes, president and general manager of the Star corporation, addressed the meeting of dealers. No statement on the proposed method of distribution of the product was forthcoming from the meeting, it being said that Downes would make a statement on this within a short time. It is reported here that the plans involve the financing of the cars until sold by the dealer. Most of the middle western territory was reported represented at the meeting, though there remains some territory yet to be assigned.

Willys-Overland Plant Producing 800 Daily

TOLEDO, Aug. 22—Despite the strikes and coal shortage, the Willys-Overland plant here has kept operating up to its high point of nearly 800 cars a day with 14,000 men employed.

The quota of production for the present quarter of the year is 47,000 cars which is the largest ever set for a third quarter.

The company recently wrote off \$1,079,675 on account of its investment in the Curtiss Aeroplane & Motors Corp. and reduced its more than \$12,000,000 investment in the Moline Plow Co., to \$1 on its books.

The non-convertible block of preferred stock has been temporarily listed in certificate form by the New York Stock Exchange. The authorized amount is \$10,000,000, of which there is outstanding more than \$8,870,000.

FRANK B. SMITH DIES

MILFORD, CONN., Aug. 21—Frank Burr Smith, works manager of the Bullard Machine Tool Co., died last Wednesday following an acute attack of appendicitis.

He was in his fiftieth year and leaves a widow. Smith entered the employ of the Bullard company in 1890 as a machinist apprentice, remaining for four years when he went west. In 1911 he returned to the Bullard company, at one time, representing it in a sales capacity in Chicago, Cleveland and Philadelphia. He became works manager in 1920. Smith was prominently active in the mechanical development of Bullard products and was the holder of several automotive and mining patents.

Oakland Is Preparing For Biggest September

PONTIAC, MICH., Aug. 21—With a temporary lull during August while shifts are made in manufacturing arrangements at the plant here, the Oakland Motor Car Co. is preparing to make September the biggest production and sales month of the year. The only difficulty confronting the factory is means of getting material into the shops, due to the railway tie-up. The plant has not thus far been handicapped by lack of fuel, and expects no shut-down on that score.

The company is building an addition to its mill room at Plant Six, which will permit of enlarged operations there. Body making is done at this plant.

Packard Plans Capacity Output Through Winter

DETROIT, Aug. 22—Since the inception of quantity shipments on the single six model in May, this year, the Packard Motor Car Co. reports that earnings have increased to a point where they now are at an annual rate of about \$6,000,000. This is reported equivalent, after all disbursements, to about \$2.85 a share on the 1,188,510 shares of \$10 par common stock outstanding, or about three times the annual 10 per cent dividend requirement. The cash balance is now about \$16,000,000, an increase of \$7,000,000 since Jan. 1.

Capacity operation is planned through the winter. Present production is reported to be approximately 2100 vehicles monthly, including single six, twin six and truck models. This production will be increased, the factory having capacity for 3000 monthly. No interference is expected from strike conditions, the company having a coal surplus ample for several months' requirements. The company is prepared to use trucks to bring in supplies of material if necessary.

EARL BALANCE SHEET

JACKSON, MICH., Aug. 21—Total assets of \$5,984,153, including current assets of \$1,557,759 against current liabilities of \$793,396 are reported in the balance sheet of Earl Motors as of April 30. The total deficit is \$1,439,419. There is a proposed issue of \$2,775,000 5 year 6 per cent debentures and \$2,285,000 7 per cent preference stock to be applied to a settlement of creditors' claims under the plan of reorganization.

Hudson, Essex Plan New September Mark

Gain of 20 Per Cent in Sales Is Expected for Last Half of Year

DETROIT, Aug. 21—Sales of Hudson and Essex cars for the last six months of 1922 are expected to run from 20 to 25 per cent heavier than in the first six months. Reports received at the factory from dealers in all parts of the country indicate ready demand for cars, in some sections the dealers being considerably behind on deliveries. Closed car sales are reported increasing.

Shipments of Hudson-Essex for the first fifteen days of August were higher than for any similar number of days in the company's history. The demand for cars has resulted in the factory increasing its tentative schedules for the later months of the year three separate times. Orders now on hand assure capacity operation for several weeks. No let up in production due to the coal or rail strikes is expected.

Total August business will show an increase over the July total which was the largest the company has had. August, 1921, business will be exceeded by 200 per cent, and the largest previous August by 40 per cent. September business will set a new September record.

Cities Largest Buyers

Increased business is reported from Portland, Ore., Providence, Dallas, Shreveport, Miami, Tampa and Lincoln, Neb. States in which business is reported running larger now than at any time this year are Oklahoma, Tennessee, the Carolinas, Georgia, Florida, Mississippi, Louisiana, Texas, Utah, Oregon, Montana, Kansas, Nebraska, Ohio, Iowa, Illinois, Indiana, New York, Connecticut, Rhode Island and Massachusetts. Most other states are ordering in about the same volume as in May, June and July.

Rural business is reported to be good, but most of the buying continues to come from the larger cities.

Hupp Sales in 7 Months Show 210 Per Cent Gain

DETROIT, Aug. 22—Reports for the first seven months of 1922 show that Hupp Motor Car Corp. sales were 210 per cent of those for the 1921 period, with July deliveries showing an increase of 87 per cent over the same month last year. August business so far is 114 per cent greater than a year ago.

April, May and June were the best months in the company's history, and for the first three months of 1922 net profits before federal taxes were \$383,656, equivalent after paying preferred dividends to about 75 cents a share on 519,210 shares of \$10 par common stock outstanding. It is expected that the June quarter will show about \$2.25 a share.

Bright Future Seen by Merger Officials

Recent Visit to Associated Motors Plants Forecasts Quantity Production

CHICAGO, Aug. 19—Quantity production at the National Motor Car plant at Indianapolis, the Traffic Truck plant at St. Louis and the Kentucky Wagon Manufacturing plant at Louisville, where the Dixie Flyer automobile is made, was forecast by the visit just made to these plants by a group of officials of the Associated Motor Industries who have returned to Chicago.

Will I. Ohmer, chairman of the board, and Louis Ruthenburg, president, of Associated Motors, with technical assistants, spent a week at these plants outlining their part in the production plan of the merger and making the preliminary arrangements for them to produce their quotas.

"We are more than pleased with the progress that has been made," Ohmer said. "All the plants we visited were in splendid condition and arrangements necessary to fit them into the co-ordination plan of the merger were well under way. An assembling unit of Associated Motors is to be operated in connection with each of these three plants and we gave some time to preliminary planning of these buildings."

Other plants in the merger probably will be visited by the officials within the next week or 10 days.

Petition Against Kentucky Wagon

LOUISVILLE, Ky., Aug. 21—An intervening petition in a bankruptcy suit against the Kentucky Wagon Manufacturing Co., has been filed by W. T. Godfrey, attorney for the Kentucky Title Savings Bank & Trust Co.

Other creditors recently stated they were willing to drop the bankruptcy suit and accept terms of a merger into the \$80,000,000 Associated Motors Industries, of which the wagon plant is a part.

Godfrey said that the petition means that the company will be thrown into bankruptcy and the merger prevented unless the bank's claim for \$45,000 is met. The bank refused to agree to the merger, which, Godfrey said, would have meant the acceptance of second mortgage bonds.

MONITOR PLANT SOLD

COLUMBUS, Aug. 21—The plant of the Monitor Motor Car Co., which has been in the hands of E. W. Pavey as receiver for more than a year, has been sold to the Clark Grave Vault Co., which will soon occupy it.

LUG COMPANIES ENJOINED

PHILADELPHIA, Aug. 21—United States District Court, Northern District of Ohio, Eastern Division, Anthony

Gorosa and the Hudson Motor Specialties Co. of Philadelphia has secured a perpetual injunction against the Simmons Manufacturing Co., Lake Erie Accessories Co., the M. & M. Co., and the American Signal Co., restraining them from manufacturing or selling lugs for power plant support for motor vehicles embodying the inventions held by the complainants or from using the term "Crank Case Repair Arm."

Westinghouse Automotive Division Is at Capacity

SPRINGFIELD, MASS., Aug. 22—The Westinghouse Electric & Manufacturing Co. is running its automotive equipment department here at top capacity, 2500 being employed in that division. Work on starting and lighting and ignition apparatus is being rushed for the fall trade. Equipment is being made for 67 different makes of cars. The new type D-A ignition device has passed all tests and will be put into regular production soon.

The present rate of production at the plant will probably be maintained through September.

Aeromarine Satisfied With Month's Report

NEW YORK, Aug. 22—The first month's operations of the flying boat service between Cleveland and Detroit—from July 17 to Aug. 17—have produced results satisfactory to the Aeromarine Airways, Inc. In all 624 passengers were carried between Cleveland and Detroit and 150 on other flights. Of these 49 per cent were women and children.

There were sixteen charter flights made by the flying boats which took in Toledo, Erie, Pa., Put-in-Bay, Ponchartrain Hotel on Lake St. Clair and the Old Club on St. Clair Flats. The flying boats crossed the lake 114 times.

Freight also was carried, one of the shipments being a Ford roadster in knock down form, the first time in commercial aviation, it is claimed, that an automobile has been thus transported.

GOOD BOSCH JULY

SPRINGFIELD, MASS., Aug. 22—July billings were larger than June's for the American Bosch Magneto Co. and branch house business was the second largest in its history. Current earnings were running at the rate of \$6 a share on the stock, and the company reports even better prospects for next year.

NOT TO TAKE DUTY PLANT

ELGIN, ILL., Aug. 22—The American Steam Truck Co. of Chicago has notified the Elgin Association of Commerce that negotiations for the proposed purchase of the Duty Motor Co. of Elgin have been cancelled. In the event that the offer of the American company is not renewed, the stockholders of the Duty company will consider other propositions for utilizing the plant here.

Miller Tire Resumes Paying of Dividends

Declares 2 Per Cent on Preferred Stock and One to Apply on Accumulations

AKRON, Aug. 21—What is considered one of the most optimistic statements issued by any rubber company in the United States since the days of unprecedented prosperity, which existed just before the precipitate slump of 1920 in the automotive industry, is issued by the Miller Rubber Co. of Akron.

The company not only resumes payment of dividends on preferred stock, after having passed six quarterly preferred stock dividends, but has declared special dividends to apply upon the accumulated dividends due preferred stockholders. A regular quarterly 2 per cent dividend on preferred stock is resumed, payable Sept. 15 to stock of record Aug. 25. In addition the company has declared a dividend of 1 per cent to apply upon the 12 per cent due preferred stockholders in accumulated dividends.

Greater Dollar Volume

In spite of the series of heavy price cuts on tires by all companies, which have greatly reduced gross revenues from sales this year over last year, the Miller company shows a 28 per cent increase in sales in dollars for the first six months of this year, as compared to the corresponding period last year. This means that Miller production and sales in units were approximately 100 per cent greater than last year, for tire companies are receiving from 35 to 50 per cent less for their tires than a year ago.

The Miller company for the first half of 1922 makes an unusually good showing as to profit, reporting net profits, after deduction of interest and depreciation and all charges except Federal Income Tax, of \$1,026,317.

The company's financial ability to resume preferred dividends and to start the payment of accumulated preferred dividends, is regarded as unusually significant as Miller is the first large company in the Akron tire district to resume dividend payments.

7,500 Tires Daily.

The Miller company now is producing more than 7,500 tires a day—far above the old peak reached in 1920. The company recently has put out two new lines of tires. One is the fabric "Rellim" tire in 30 x 3 and 30 x 3½ sizes. The other is a new Wedge tread cord tire in all sizes.

Miller officials although optimistic regarding the future say they will not venture any prediction due to the extremely low tire prices. The company is in an unusually sound financial condition and has extended its ramifications to such an extent that additional factory space and facilities may soon be necessary in order to increase production commensurate with current demand for tires.

Men of the Industry and What They Are Doing

Williams Goes Abroad

O. H. Williams, export manager of the Hudson Motor Car Co., sailed for Europe this week on a trip which will take him through the British Isles, the Scandinavian countries and other countries on the continent. The trip is in connection with Hudson exports, which are reported by the factory to be steadily increasing.

Grant Advances Parker

D. K. Parker, former assistant purchasing agent of the Grant Motor Car Corp., has been promoted to the position of purchasing agent, left vacant by the resignation of G. C. Starkweather, who has joined the Buffalo Pressed Steel Co., as assistant to the president, R. J. McKenzie.

Davis Becomes Durant Official

James A. Davis, for three years manager of the Advertisers' and Investors' Protective Bureau of the Chicago Association of Commerce, has resigned to join the various Durant automobile interests as a vice-president. His work will be in connection with the financing and marketing undertakings, with special reference to the co-ordination of the activities of the related corporations. His headquarters will be in New York, but he will spend a good deal of his time in Chicago and in the West. As a member of the State "blue sky" commission he has been a special investigator of "blue sky" law violations for the Secretary of State of Illinois.

Rowley Gives Up Sales Work

W. C. Rowley vice-president in charge of sales of the Federal Motor Truck Co., has resigned, but will remain as a director of the company. He has been sales director for the past five years. F. F. L. Pierce, sales manager, is now in charge of the sales department.

B. F. Wright Resigns

B. F. Wright has resigned as chief engineer of the Republic Motor Truck Co., Inc. He was formerly with the Federal Motor Truck Co. in a similar capacity.

Haynes Advances Radoye

Gilbert U. Radoye, who for the last three and one-half years has been director of advertising and sales promotion for the Haynes Automobile Co., has been appointed director of sales and advertising for that company. He will continue to direct the advertising and sales promotion divisions, in addition to his new duties. Before becoming associated with the Haynes company, Radoye held impor-

tant positions in the sales and advertising departments of other automobile manufacturing concerns. He is a member of the advertising committee of the National Automobile Chamber of Commerce.

White Calls O'Mara to Factory

Martin A. O'Mara, for the past two years manager of the Kansas City branch of The White Co., has been made a vice-president of the company and a member of the sales committee, with headquarters at the general offices in Cleveland. O'Mara entered the employ of the company about six years ago as a salesman in the St. Louis office, going to Kansas City as a salesman in 1917, where his efficient work led to his promotion as manager of the Kansas City territory in the early part of 1920. As a member of the sales committee at the general offices, O'Mara will have supervision of White truck sales in the territory covered by the following branches: Kansas City, Tulsa, St. Louis, Memphis, New Orleans, Dallas, El Paso and Houston.

Oakland Promotes Whitfield

Morris Whitfield, for several years in the employ of the Oakland Motor Car Co. as an accountant at the Oakland plant, has been elected assistant treasurer of the company, under Thomas Mayer, comptroller.

Osterheld Goes with Own Company

Clark Osterheld, assistant general superintendent of the Stoughton (Wis.) Wagon Co., in charge of the motor truck department, has resigned to become president of the Stoughton Manufacturing Corp., recently organized to manufacture electric water heaters and other electrical devices designed and patented by him. When the wagon concern engaged in the manufacture of trucks several years ago, Osterheld took an important part in the work of designing and placing in production the Stoughton freight car.

Gould Joins Malleable Iron

A. R. Gould, a director and general manager of the St. Louis (Mo.) Malleable Casting Co., has resigned, effective Sept. 1, to join the Malleable Iron Range Co., Beaver Dam, Wis., as vice-president in charge of production. He is one of the best known men in the light malleable casting field, in which he has specialized for twenty years. It is understood that the Beaver Dam concern is planning to invade the automotive and power farming equipment field and that Gould will have special duties in this relation.

Campbell Returns to Firestone

Homer C. Campbell, chief administrator of the city of Akron since Feb. 1 of this year, has resigned, effective Sept. 1 to join the Firestone Tire & Rubber Co., with whom he was affiliated before being named city manager. He will become assistant treasurer of the company, in charge of foreign and domestic credits and will serve as chairman of the operating committee of the Coventry Land & Improvement Co., controlled by Firestone and providing homes for Firestone employees.

Campbell's successor will be M. P. Tucker, until last February chief construction engineer for the Firestone company and former district construction engineer here for the Pennsylvania railroad. Tucker was named waterworks superintendent by Campbell on Feb. 15 and was elevated to the city's service directorship on July 1.

L. E. Porter Advanced

L. E. Porter has been appointed assistant general manager of S. F. Bowser & Co., Fort Wayne, Ind. Porter for the past three years has been director of publicity. Roscoe L. Heaton, formerly assistant to the president, succeeds him as advertising manager.

Owen Engineer with Lacey

Richard L. Owen, formerly identified with the Brown & Sharpe Manufacturing Co. as engineer, with Remington Arms & Ammunition Co. as tool engineer, and associated with the Cadillac Motor Car Co., is now interested with Arthur H. Lacey, consulting engineer, Oakland, Cal., in charge of tool engineering. The Lacey organization has been enlarged so that, in addition to automobile and internal combustion engineering, it is actively engaged in production and tool engineering.

Hopkins Joins Rackliff

Benton Hopkins, formerly advertising manager of Denby Motor Truck Co., Detroit, and previous to that associated in an advertising capacity with other automotive manufacturers, has joined the H. L. Rackliff Co., automotive marketing counselors of Cleveland and New York. Hopkins will be associated with the Rackliff organization as advertising counselor.

Wood and Rueckert Appointed

The Cowan Truck Co., manufacturer of industrial trucks and tractors, Holyoke, Mass., has appointed Frederic Rueckert sales manager and Keith A. Wood head of the material handling division, organized to promote efficiency in the handling of manufactured products. This service will be at the disposal of customers.

Electric Convention to Convene in Maine

Subjects Relating to Starting, Lighting and Ignition to Be Discussed

NEW YORK, Aug. 22—The annual summer meeting of the Automotive Electric Association to be held at Old Orchard Beach, Me., Aug. 29 to Sept. 1 will consider three dominant subjects relating to starting, lighting and ignition.

A greater use of standards by manufacturers of these products is to be urged, many of the makers being back of the movement. One manufacturer of electric equipment reports that of 67 customers, only three use accepted standards, the case referred to being that of flange sizes for attaching starting motors to the crankcase. There is a demand to standardize output of generators and to arrive at perhaps four or five output classifications or standards. President A. D. T. Libby of the association is eager to have all rational standardization that reduces costs of parts or maintenance pushed.

Will Discuss Service

Service will come in for lengthy consideration, the service managers of the member companies having a special program. The education of dealer organizations in service is one of the objectives aimed at. Earl Turner has charge of this division of the work.

The association has done good work for many years in adjusting patent problems among its members and this work will be furthered at Old Orchard.

The storage battery division under chairman R. J. Nightingale will hold two sessions.

Joseph Bijur is chairman of the standardization committee and Victor S. Beam of the legal and patent committee.

Creditors Ask That Metz Be Adjudged Bankrupt

BOSTON, Aug. 19—The Metz Co., of Waltham, Mass., maker of the Metz Master Six, was petitioned into bankruptcy here yesterday by three creditors. A hearing will be granted on the petition next week. Two of the creditors brought the proceedings as a result of judgments received against the company last June, and a third has an assigned claim.

The petitioners were the Johns-Manville Co., \$442.19, judgment recorded June 16; The Culver-Stearns Manufacturing Co., Worcester, \$67.57, judgment recovered the same date as that of The Johns-Manville company, and Jacob I. Hanflig, Chelsea, on a claim assigned to him by the M. I. Hubbard Spring Co. for \$108.52 on Aug. 2.

REO TO RETURN TO OLD TIME

DETROIT, Aug. 22—The Reo Motor Car Co. will resume operations on a full

five and a half day week after being on a five day operation throughout the summer. It had been the company's plan to work the short week through the warm weather period, but sales have increased to such a point that it is necessary to get largely increased production. The speed wagon business, which has been steady all year, has been augmented by large increases in passenger car business following the reduction of prices and the presentation of new models.

PERSONAL NOTES

Service Appoints Gillam

G. L. Gillam, formerly associated with the International Harvester Co. in the sales department of the truck division, has been appointed sales manager for the Service Motor Truck Co. Rolfe C. Spinning has severed connections with the company as advertising manager and has accepted a position with the Service Corp. of Troy, N. Y. His place is being filled by W. E. Murphy.

Leidy with "Michigan Alumnus"

Paul Leidy, formerly secretary-treasurer of the Michigan Drop Forge Co. at Pontiac, has been made business manager of the *Michigan Alumnus*, weekly publication of alumni of the University of Michigan. He is pursuing a law course at the university.

O'Rourke Heads Suburban Gas

J. Slocum O'Rourke, formerly with the Oakland Motor Car Co., is now president of the Suburban Gas Co., with headquarters in Detroit, manufacturing a gasoline heating and lighting apparatus for suburban homes.

Powe Gives A. E. A. Full Time

W. R. Powe has discontinued his connections with all other organizations and will hereafter give full time as general traffic manager of the Automotive Equipment Association of Chicago.

Receivership Is Ended of Watson Products Co.

SYRACUSE, Aug. 22—Federal Judge Ray has signed an order authorizing the re-organization of the Watson Products Co. of Canastota and ending the receivership which has been in effect about two years.

The Watson Truck Co. is the name of the new concern. Indebtedness of the old company will be met by giving first preferred stock in the new concern to all creditors with claims of more than \$1,000. The creditors accepted the stock proposition.

The report of Kirk B. Delano, receiver, will be formally received by the court Sept. 21. The company, with an indebtedness of \$550,000, has been manufacturing motor trucks under the receivership, and business is reported to have shown a decided improvement of late.

Gliders Open Epoch in Aerial Studies

German Student Makes Flight in Wiesbaden in Wind of 17 to 20 m.p.h.

NEW YORK, Aug. 22—The gliding in a motorless monoplane for 2 hours and 10 minutes by Hentzen, a student of the Hanover Institute of Technology, on Aug. 18 near Wiesbaden, Germany, has opened a new epoch in the study of aerial flight, as such gliding pioneers as Otto Lilienthal in 1896 in Germany, Percy S. Pilcher in England in 1897, Octave Chanute in America in 1897 and the Wright brothers in 1901 never glided over a few hundred feet and remained in the air a matter of seconds, with the exception of the Wrights.

Hentzen made his flight in a wind of 17 to 20 m.p.h., and started from a cliff at Mount Wasserkoppe on the Rhone watershed near Wiesbaden. At the start he rose to a height of 100 meters, where he hovered for some minutes and then rose another 100 meters, and at a height of approximately 800 feet hovered back and forth for nearly two hours. When the wind fell to 12 m.p.h., he descended in a long glide and landed very closely to the point from which he had started.

Monoplane Design

Details of the Hentzen glider or sailplane are lacking, but it is a monoplane design with the fuselage located between the two wings which are movable so that by a series of levers Hentzen was able to ascend or descend. The fuselage and wings are wood construction covered with fabric. The total span approximates 35 feet and the area is 140 sq. ft.

A fellow student of Hentzen's, named Martens, flying the same glider, remained aloft 1 hour and 6 minutes.

In the French glider tests held at Clermont-Ferrand over a period of two weeks, the duration flight was 49 minutes and 59 seconds, total time in air on different occasions, made by a Farman biplane. The take-offs in the French trials were made from an altitude approximately one-third the height of Wasserkoppe, the German take-off point.

The gliders used by the Germans, Hentzen and Martens, were constructed through funds raised by fellow students.

Early Study of Subject

The art of gliding played a very important part in the evolution of the airplane. As long ago as 1862 students were studying the subject, and at that time Otto Lilienthal began his first studies which continued until 1896, when he was killed in a 50 foot fall when his glider took a nose plunge. Lilienthal's greatest discovery from his gliding experiments was that the curved surface of the wing was superior to the flat surface; in fact, the curved wing was an essential to flight. He made upward

(Continued on next page)

Gliders Open Epoch in Aerial Studies

**German Student Makes Flight at
Wiesbaden in Wind of
17 to 20 m.p.h.**

(Continued from preceding page)

of 2000 glides, some of his gliders weighing 50 pounds and having 100 sq. ft. of sustaining surface. His first glider of this size was built in 1891.

Lilienthal relied on moving his body with reference to the wings for balance and control, and it was in experimenting along this line that he met his end. He gave much time to the study of flight and tabulated the amount of resistance offered the flight of a bird. It was from his observation of bird flight that he discovered the curved wing. Most of his glides were made with a monoplane, but in 1895, the year before his death, he developed a biplane glider.

Pilcher Follows Lilienthal

After his death, Pilcher, the Englishman, took up his work and built gliders with 300 sq. ft. of sustaining surface and weighing 55 pounds. Pilcher hoped with a very small engine, perhaps 4 hp. or a little more, to accomplish mechanical flight, but in 1899 he died as a result of a 30 foot fall in his latest glider, the Hawk. He used a tail plane on his gliders.

In America Octave Chanute, who had visited Lilienthal, started gliding experiments in 1896 with a Lilienthal type of glider. These experiments were carried out on the sand hills along the east shore of Lake Michigan, 30 miles from Chicago. He made glides of 8 to 12 seconds, making 200 to 300 in all. He used a steering tail and had one glider with five planes, one above the other. Chanute started his work when 60 years of age.

The Wright brothers were great students of Lilienthal, and from 1896 to 1902 were engaged in glider tests, mostly conducted at Kitty Hawk, N. C., where they went to work where winds were 17 to 20 m.p.h., a speed well suited for such work. The Wright brothers made hundreds of glides. They used a biplane design, and in a wind of 25 m.p.h. remained in the air 10 minutes and one second. The glider had an area of 308 sq. ft.

Langley Not a Glider

Samuel Pierpont Langley, according to Charles M. Manly, who was a fellow-worker with Prof. Langley, did not attempt any gliding experiments, but confined all his efforts to mechanical flight, and the engine developed by Manly for the plane generated 50 hp. and weighed only 120 pounds, or 2 1/5 pounds per horsepower. The plane weighed 730 pounds and had 1040 sq. ft. of sustaining surface. Langley was well acquainted with Chanute and closely followed his gliding experiments, recognizing the value of such in the evolution of mechanical flight.

In discussing the results of the German flight, Manly said to-day:

A great deal can be learned from gliding tests such as the recent German ones. The perfection of airplane lines and minute studies of economics of power are certain to follow. While gliding experiments are only a means to an end, gliding tests will do a great deal to reduce aviation costs and indicate possibilities for the development of commercial aviation. All accomplishments in matters of this kind flow from thoughts of wide diversity of mental attitude. Experimental research in gliding, under very wide ranges of thought, will result in much improvement. The greater study of air currents is one great essential of aviation and gliding contests will greatly stimulate such.

Manly looks for much of the development to come from students and others not tied hand and foot by traditions, but who venture into unknown fields.

Curtiss Completes Glider

NEW YORK, Aug. 23—Coincident with the publication of the sensational results in the German trials, Glenn H. Curtiss, chairman of the executive committee of the Curtiss Aeroplane & Motor Corp., announces the completion of a glider by his company which will be given its first public tests on Great South Bay shortly after Labor Day.

Curtiss personally will fly the glider in the tests.

This biplane flying boat glider is constructed of wood, duralumin and silk. Its dimensions are: Weight (empty), 150 lbs.; loaded (one man), 310 lbs.; span, 28 ft.; chord, 60 in.; gap, 54 in.; length over all, 22 ft. 11 in.; wing area, 267.5 sq. ft.; hull, 13 ft. 2 1/4 in. long; beam, 30 in. The hull is made of duralumin and the glider is said to be capable of a speed of 20 m.p.h.

Curtiss is of the opinion that better results may be had in flying over water instead of land, and most of his experiments have been conducted in this manner.

New Process Gear Sale Postponed Until Sept. 6.

SYRACUSE, Aug. 22—W. C. Durant is expected to purchase the New Process Gear Co. of this city at the receivers' sale Sept. 6. The date for the sale was set originally as Aug. 23, but George R. Lunn, special master, announced that an adjournment had been decided upon.

It is understood that this was agreed to after a conference preceding the proposed sale when prospective bidders asked for time to complete negotiations to finance the purchase. The upset price is fixed at \$1,900,000.

Plant Valued at \$3,500,000

The New Process plant, a subsidiary of the Willys Corp., has been making gears for the Durant and Star cars for some time, and is valued at approximately \$3,500,000.

Representatives of a number of automobile companies were on hand for the sale, and some deposited the required \$50,000 certified checks to make them eligible for bidding.

Ford to Hold Tests in South America

Prepares for Tractor Demonstrations—Big Future in Industrial Field

NEW YORK, Aug. 22—The industrial use of motor tractors will be promoted in the foreign field by the Ford Motor Co. through the staging of industrial demonstrations such as have been held recently in various cities of the United States. According to information received here, demonstrations of this character are now scheduled to be held in Buenos Aires, Argentina; Montevideo, Uruguay, and Sao Paulo, Brazil, where the Ford company maintains factory branches, and in addition at Rio de Janeiro, Brazil, in connection with the company's exhibition at the Brazilian centennial.

The first of these foreign demonstrations will be held at Buenos Aires early in September and, in preparation for it, shipments of rubber-treaded tractor wheels and three-ton trailers have been made to the Argentine by Sherman & Sheppard of New York who control these products for Latin-American sales. The possibilities of industrial sales for motor tractors were said to be large, as the result of a recent meeting of Fordson agents in Buenos Aires. The local Ford manager there stated that a considerable part of their future tractor trade undoubtedly would be for such purposes. Similar expressions have come from the other South American cities.

Builds Locomotive

The Sao Paulo branch announced during July that it had completed the construction of a Fordson tractor locomotive that will be used for light haul work on the railroads in that district. This machine was rebuilt for rail uses in Brazil. It will be of particular value, it was stated, on sugar plantations because of the fact that it will not endanger fire from flying sparks as is the case with a steam locomotive.

Ford Boilers to Burn Oil During Shortage of Coal

DETROIT, Aug. 23—The Ford Motor Co. has equipped its boiler plant at the Highland Park factory with oil burning apparatus which will enable it to continue operations in full for the duration of the coal shortage. The change was made after an experiment with coke screenings which proved impractical.

Twelve million gallons of oil have been ordered and will be brought in largely over the D. T. & I. The company believes sufficient oil can be obtained to carry it through the coal crisis but it is not the intention to change to oil fuel permanently. The oil will be supplied to the boilers from a reservoir 3,000 feet from the engine room.

Bodies and Chassis Changed in Mitchell

Increased Price of \$100 on Two Models Includes Addition- al Equipment

RACINE, WIS., Aug. 23—Mitchell cars with revised bodies and refined chassis are now in production. While there are changes in almost every part of the car, making the car a really new job, yet the fundamental design and construction is practically identical with the previous model. The car has been improved both mechanically and in looks, and in step with this advance in class is a slight increase in price in some body models.

Here are the new and old prices:

	Old Price	New Price
3-pass. roadster	\$1,490	\$1,590
5-pass. phaeton	1,490	1,590
4-pass. sport model.....	1,690	1,690
4-pass. coupe	2,050	2,050
5-pass. sedan.....	2,275	2,275
		Not
7-pass. phaeton	1,690	announced
		Not
7-pass. sedan	new	announced

A news item in the Aug. 17 issue of AUTOMOTIVE INDUSTRIES to the effect that Mitchell prices had been increased an average of \$160 was perhaps misleading. As a matter of fact, the increased prices included more than that value in addition equipment which had been previously quoted separately. The new prices given here include wood wheels and without de luxe equipment. The net change, therefore, in prices is an increase of \$100 on two models.

Bodies Redesigned

The bodies have been entirely redesigned, and the sharp lines have been replaced by curved lines. The same F-50 engine is used, but the tappet guide blocks are made in pairs now, instead of blocks of six. This has been done to relieve the stress on the cylinder block and in the guides themselves. The method of making the rear axle shaft and hub is new. A billet of steel 4 x 11 in. is used in forging out the entire axle and hub. The rear hub caps have been greatly increased in size.

The Mitchell line is now confined to two wheelbases, 120 and 127. The 7-passenger phaeton and 7-passenger sedan are mounted on the longer chassis, and prices on these models have not yet been announced. All other bodies are on the short wheelbase.

GASOLINE CONSUMPTION

WASHINGTON, Aug. 22—Reflecting the increased use of automobiles as the result of greater production during the spring and summer months, statistics compiled by the Bureau of Mines show that the domestic consumption of gasoline for the first six months of this year increased 16 per cent.

The production of gasoline for June

amounted to 525,940,600 gallons, an increase of 12,000,000 over May and 51,000,000 gallons over April. Domestic consumption for May represents an increase of 41 per cent in consumption as compared with the same month a year ago, while a similar comparison for June shows a 14 per cent increase, a more nearly normal figure. Stocks for June were 10 per cent in excess of last June.

Imports of gasoline for June amounted to 3,986,655 gallons; exports were 52,730,998 gallons; and shipments to insular possessions were 1,872,776 gallons.

The output of lubricating oil for June was 80,138,257 gallons, which indicates a daily average increased production of 95,000 gallons. The seasonal demand for lubricants reduced stocks to a figure of 226,903,812 gallons on hand July 1, a decrease during the month of 39,000,000 gallons.

\$2,760 Speedway Roadster Is Added to Stutz Models

INDIANAPOLIS, Aug. 23—An addition to the Stutz line has been made in the shape of the Speedway roadster, a sport model, which will list at \$2,760.

Equipment is the feature of the new-comer, one of the new things being a circular trunk which fits into a specially designed well in the rear deck of the car. The trunk holds two large suitcases. In addition to headlamps and spotlight, the roadster is provided with two small cowl lights and a parking lamp mounted on the left rear fender.

Two extra wheels, fitted with cord tires provided with moleskin covers carrying the Stutz crest, are furnished. Other conveniences are the heavy double bar bumper, plate glass side windshields, adjustable cowl ventilator, automatic windshield cleaner, rear view mirror and individual scuff and step plates.

Few Dwellings Available For New Flint Employees

FLINT, MICH., Aug. 23—A review of the housing situation at Flint is causing some apprehension among factory executives and city officials, in view of the increased operations of existing factories and the pending opening of several new plants.

An investigation of manufacturing conditions shows that Buick is adding to its employees at the rate of 100 a day; Mason Motor Truck Co. and the Martin-Parry Corp. are about to open plants; Chevrolet declares that its force will be increased by about 3000 by next spring, and Durant building plans call for the completion of the Flint factory by spring.

There is no unemployment in the city now, and it is reported that all of the new help required will have to come from outside the city. There are fewer than 100 available dwellings reported, and many real estate agents report a waiting list of persons seeking homes in certain sections.

Builders and real estate men estimate that between 4000 and 5000 homes will have to be built within two years.

Navy Tests Packard Engine for Aircraft

Built to Government Specifications—Allison Reduction and Reverse Gear Used

WASHINGTON, Aug. 23—The Bureau of Aeronautics of the Navy Department announces the completion of a 300 hour endurance test of the Packard six cylinder engine, which has been built to meet the needs of the rigid airship ZR-1 which the bureau has undertaken to construct.

In this test the engine was mounted on a test stand under a shed, open at both ends. It turned a calibrated pitch club and was run at power corresponding to the cruising requirements of 250 b.h.p. at 1400 r.p.m. at normal cruising altitude of 6000 ft. At the end of the 110th hour the engine was given a wide open throttle run and developed 350 b.h.p. at 1555 r.p.m. In order to check any power loss, the engine was again opened up at the 300th hour and developed 365 b.h.p. at 1577 r.p.m., thereby showing a slight gain in power.

The fuel consumption for the entire 300 hours was .436 lbs. per b.h.p.

Description of Engine

The engine was built to the specifications of the bureau by Packard, while the reduction and reverse gear was made by the Allison Engineering Co. The motor is known as the Packard model 1-A six cylinder water-cooled engine, with 6% in. bore and 7 1/2 in. stroke, with a rating of 300 h.p. at 1400 r.p.m.

The Allison gear is a combined clutch and reduction gear. The clutch is of the multiple disc type and the reduction gear planetary with spur gears. The gear reduction permits of a propeller speed of 550 r.p.m. when the engine is turning 1400 r.p.m. The gear is fitted with its own lubrication system. Propeller efficiency at low engine speeds being required, the reduction gear was adopted, and the clutch is necessary in order to warm up the engine in the hangar without turning the propeller. The gear is fitted with a brake which is used to hold the propeller when the clutch is disengaged.

The ZR-1 is to be powered with six engines of 300 h.p. each, and it was necessary to design engines which would meet the needs of this airship. Not finding anything in the market to meet their needs, the Navy Department engineers on the board drafted specifications which have been met by Packard and Allison.

REDUCTIONS IN PATERSON

DETROIT, Aug. 18—W. A. Paterson Co., manufacturer of the Paterson car, has reduced prices on all its models as follows:

	Old Price	New Price
5-passenger	\$1,550	\$1,390
7-passenger	1,585	1,425
Coupe	2,595	2,395
Sedan	2,595	2,395

No Slump Apparent in Chicago Decline

Falling Off of Sales Slight—Dealers Feel Failure to Obtain Deliveries

CHICAGO, Aug. 21—It is the general opinion of close observers of retail automobile sales in and around Chicago that whatever effect the recent price reductions of a number of lines had was to slow up sales and that in the slowing the lines reduced suffered as much or more than other lines. Sales have fallen off so slightly, however, that it is doubtful whether any of the decline should be attributed to the price reductions. Certainly a seasonal decline of some degree was due after the unusual selling of June and July, and all things considered the decline in sales has been less than was expected and by no means great enough to be called a slump.

Some of the more popular medium priced cars are selling as well as at any time this season. The Chicago agency for a well established make selling under \$1,000 is just as far behind with deliveries as at any time this summer and is now booking orders for delivery in 60 days. This company has lost many sales this summer because of this situation. A popular car in the high price class which was announced this summer is now being sold in Chicago for delivery in December at the earliest.

Catching Up with Deliveries

Some of the agencies for popular cars are catching up with deliveries and the ability of buyers to get fairly prompt delivery on the established lines has caused the cars not so well established to suffer some loss of sales.

The record of time sales compiled by the Central Automobile Finance Association shows that sales thus far in August have been about on the same level as July. For the first two weeks of July the time sales numbered 1973 and in the first two weeks of August the number was 1892.

Sales of closed cars have been running unusually heavy. A dealer with a large number of orders on hand for delivery as soon as possible finds that the orders for open cars exceed those for closed cars by only 20 per cent. Another dealer in a position to make deliveries within two or three weeks is making 80 per cent of his sales on the closed models.

Medium-priced cars are leading the field in sales right now with low priced cars running a close second.

IMPROVEMENT IN TEXAS

DALLAS, Aug. 21—There appeared to be some improvement in the automotive business in Texas during July and the first half of August. Dallas retailers reported increased sales of cars and trucks while accessory men said their business was holding its own. The general tire

trade was some better but competition was keener, due to many merchants in other lines handling tires.

Tractor sales showed some increase and sales of trailers were picking up.

The outlook is regarded as promising better conditions in the trade. The cotton crop is now beginning to reach the market and the grain is moving. Automobile dealers stated they expect September and October to be among the best months of the year.

Good Outlook for Fall, Philadelphia Reports

PHILADELPHIA, Aug. 19—Reports for the past week reaching the Philadelphia Automobile Trade Association headquarters show that sales of new cars are fair. A few dealers claim to be considerably ahead of last year's figures.

Thus far this month sales of accessories and parts have been unusually good, notwithstanding the fact that a very large number of cars have been withdrawn from the immediate territory through the absence of their owners at resorts or on prolonged tours.

Some distributors of accessories state that July business was far ahead of the corresponding month a year ago, and that it looks as if August sales might be in the same class. A good start has been made, and the outlook for fall trade is regarded as particularly promising. Customers who have been holding back for some time will be compelled to make purchases in a month or so, if they wish to run their cars.

Business in the trailer field is quiet. The tractor trade, which took a small spurt following the recent Fordson show here, is again dull, and the truck business, which for a few weeks gave promise because of some large sales of units for fleets, appears to have subsided.

Portland Establishes High Record in July

PORTLAND, ORE., Aug. 16—July this year proved the greatest month in the history of Oregon in the number of new cars for which licenses were taken out.

It exceeded by almost 100 per cent any previous month of 1922. Despite the unusual record for July the present year thus far is still considerably behind the sales record for the first seven months of 1920, although many laps ahead of the corresponding period of 1921.

Two factors enter into the record made by July. These are a reduction of 50 per cent for July 1 in the license fee for the year, new cars being taxed only for the last half of the year and the fact that during July the state motor bureau began arresting dealers for what it asserted was improper use of dealer licenses. As a result many of the dealers gave up their dealer licenses and began licensing their new cars immediately upon arrival, passing the cost of the license on to the purchaser. Several hundred cars were thus licensed in July which were not sold until August.

Program Made Ready for Steel Meeting

Two Societies Will Hold Exposition and Convention in Detroit, Oct. 2-7

DETROIT, Aug. 21—The fourth international steel exposition and convention of the American Society for Steel Treating the American Drop Forging Institute will be held in the General Motors building here Oct. 2-7.

The annual banquet of the two organizations will be held jointly in the ball room at the Statler, with C. F. Kettering, president of the Dayton Engineering Laboratories Co. and a member of the American Society for Steel Treating since its organization, serving as toastmaster. President Burton of the University of Michigan will be one of the speakers as will the Governor of Michigan and some chief executives of the largest steel companies in the country.

Among the plants to be visited by the delegates are the following: Ford Motor Co.'s Highland Park plant; Ford Motor Co.'s River Rouge plant, Cadillac Motor Car Co., Central Forge & Gear Co., Lincoln Motor Car Co., Detroit Steel Products Co., Detroit Twist Drill Co. and Hudson Motor Car Co.

Papers to Be Presented

Several papers of interest to the automotive industry will be read, among them being: "Carburizing and Decarburizing in Case Hardening," H. B. Knowlton; "Case Hardening," A. H. d'Arcambal; "Irregularities in Case Hardened Work Caused by Improperly Made Steel," E. W. Ehn; "Some Features of Industrial Heat Treating Electrically," C. L. Ipsen; "Heat Treating of Automobile Springs," A. E. Fuller; "The Uses and Abuses of Tool Steels from the Standpoint of the Producer and Consumer," W. P. Woodside; "Effects of Structure upon Machining of Tool Steel," J. V. Emmons; and "Heat Treatment and Properties of Duralumin," H. C. Kneer.

Buffalo Is Satisfied with Business of Year

BUFFALO, Aug. 19—Buffalo's automobile dealers are well satisfied with the business done so far this year, and are correspondingly pleased with the fall trade outlook.

July's business ran ahead for June, which had showed some falling off compared with May, when sales were slightly less in volume than in April, the banner month of the year.

Some of Buffalo's retailers in medium priced field complain of being unable to get deliveries from their factories on certain models, and say the volume of their sales during July would have been considerably greater if their factories had been able to supply their demands.

Year Closes in Peru With All Stocks Sold

Next Big Impetus Comes with Summer Season Opening in December

LIMA, PERU, July 31 (*By Mail*)—The celebration of the national holidays of Peruvian independence the last days of July marks the close of the automobile year in Peru. Business in automotive lines prior to these holidays is always very brisk, because the public likes to ride in new and newly equipped automobiles at this time.

The close of the automobile year in Peru finds the merchants practically sold out of all cars that they had in stock, so that they have a clean slate with which to begin the new automobile year.

Motor Buses Increase

The next big impetus, after the national holidays, that comes to the automobile business in Peru, is the opening of the summer season in December. There is not a great deal of difference between winter and summer in Peru, but as there is more sunshine and more pleasant weather in summer, sales of motor cars and motor car equipment always pick up in December with the beginning of the South American summer.

During the last year motor buses have increased from 1 to 60, and a continued equally rapid growth is only prevented by lack of well paved streets and good roads. Most of the buses are built on the Ford truck chassis, but there are two Renault, two Chevrolet, two Graham Brothers and three Benz. The latter are double deckers, the first German automotive success in Peru since the close of the great war.

Good Roads Support Urged

American manufacturers who are interested in the sale of automotive products in Peru should urge their agents to inaugurate, push and support good roads movements. In 1917 the National Association of Manufacturers of New York issued a pamphlet giving the number of automobiles in the different countries and the potential capacity. Peru was put down with 500 automobiles and a capacity of 3000. The 1922 book of Facts and Figures of the National Automobile Chamber of Commerce gives the present number of automobiles and trucks in Peru as 3900. The limit set five years ago has been reached and passed. A like rapid growth in the future will not be possible unless there is an inaugurated and feverish activity in road building. Why is it that Americans and Peruvians are so slow to realize this?

Exchange has hovered above \$4 for Lima in New York, and about 9 per cent premium for Lima on London. A year ago exchange on London was more or less the same as now, but exchange

on New York was \$3.27. The improvement in New York exchange has greatly heartened the trade in Peru, and the tendency is toward further improvement.

An increase in the price of Peru's principal exports, as for example, a rise in the price of cotton, copper, sugar, wool, would greatly improve automotive prospects. A marked movement in any of these products should be a signal to the American manufacturer to push harder for business in Peru.

The automotive business in Peru has got its second wind. If concerted action is taken along certain lines—road improvement and elimination of certain trade abuses—there is no reason why the business cannot continue to grow in the future as it has done in the past.

Rest of Year Holds Out Good Prospects

(Continued from page 386)

and that the rest of the builders will rely on new models or public acceptance of current models for their sales appeal from now until the 1923 shows.

New models for 1923 are making their appearance every week. The list already is quite formidable and will continue to grow until the closed car shows of September and October, when most makers will have finished their alterations in chassis and body design until the advent of the mid-winter shows. As in the past, a good many of the 1923 cars now offered to the public will stand without change for a twelve months' period. The growing recognition of the closed car as the year round car is giving impetus to the making up of a long list of fall shows which will foster this movement.

It seems certain now that the automotive industry will go through to the end of the year making substantial profits for its widely scattered stockholders, giving employment to its workers on virtually a 100 per cent basis and providing business for many industries which but for the patronage of the motor vehicle makers would have put in a disastrously slim year.

ENCOURAGEMENT FROM WEST

DETROT, Aug. 21—Reports on conditions brought in by executives of prominent automobile companies who have been traveling through the west are encouraging. Corn, they say, is in good condition and promises a profitable crop. When the corn money comes in the farmers will be in a better financial condition than they have been for some time and this will help in the sale of cars. Conditions, too, are improving in Utah, where the copper smelter works were closed for some time. Now they are in operation again, giving employment to a large number of men.

Receiver Is Named for Supreme Motors

Seen as Part of Movement Leading Up to Possible Automotive Merger

CLEVELAND, Aug. 24—N. A. Wolcott of Warren, Ohio, has been appointed receiver of the Supreme Motors Corp. of Warren by Federal Judge D. C. Westenhaver of this city. The appointment was made on the application of the Trumbull Manufacturing Co., Park Hardware Co. and Aetna Foundry Co., Warren, concerns which sold materials to the corporation.

It is said that this step was anticipated by both creditors and stockholders and really is a step taken to determine the status of the company and check its assets and liabilities. It follows rumors of a possible merger with several parts making concerns and a prominent automobile manufacturer. It is believed the action was started to make this merger possible.

A receiver had been appointed previous to the action in Cleveland by the common pleas court of Trumbull County, in which the plant is located. This is said by the petitions in the Federal Court to have been an act of bankruptcy. Assets of the plant are placed at \$300,000 in real estate, buildings and machinery and \$250,000 in personal property. Liabilities are not given.

The Supreme Motors Co. has been in operation for about three years and is incorporated for \$5,000,000.

Strike Settlement Heartens Milwaukee

(Continued from page 388)

hands of purchasers at the time of closing the deal. Quantity deliveries of new cars as yet are slow, which is true particularly of closed types.

At the same time the demand for closed cars is relatively much heavier than at any time in the history of the business. It is a matter of much favorable comment among buyers that manufacturers have succeeded in bringing the cost of closed types closer to the price of open cars.

As might be expected, dealers in cars that have not been reduced in price encounter constantly the expression of a conviction on the part of their prospects that they will be able to buy more cheaply later.

RECEIVER FOR SHAPER MAKERS

MILWAUKEE, Aug. 21.—The Milwaukee Shaper Co. has been placed in the hands of a receiver on petition to the circuit court by the Allis-Chalmers Manufacturing Co. and other creditors. Julius J. Goetz has been appointed. The company was one of the largest manufacturers of shapers and similar metal-working tools in the Middle West.

Spanish Duty Same to U. S. and France

Readjusted Tariff Clauses Give America Most Favored Nation Treatment

WASHINGTON, Aug. 22—Motorcycles, automobiles, motor trucks, chassis and detached parts, and rubber products, including tires, made in the United States are included in products which are given the benefit of reductions in Spanish tariff duties. These reductions are similar to those recently granted to France as a result of the Franco-Spanish treaty and give assurance that American products will continue to enjoy most-favored-nation treatment from Spain.

The concessions and duties granted by Spain to Switzerland by the treaty of May 16, 1922, which in practice already had been extended to similar American products, are likewise confirmed by the present order of the Minister of Finance of Spain.

Owing to conflicting interpretations on the part of the Spanish customs officials as to the application of the concessions granted to France to similar products of other countries, a definite ruling from the Spanish Minister of Finance was informally requested by Commercial Attache Cunningham, working in co-operation with the American Embassy. The concessions in duties granted to France by the terms of the Franco-Spanish treaty and extended to the United States amount to reductions of 20 to 25 per cent from the second column which has heretofore been the minimum scale of import duties into Spain.

Reductions Listed

Among the principal lines of goods affected by these reductions, which are of interest also to American exporters, are the following, together with an indication in each case of the approximate amount of reduction from the second column:

	2nd Tariff ad valorem	French Rate ad valorem
Motorcycles	25%	20%
Automobiles	25%	15%
	to 30%	to 25%
Motor trucks	20%	15%
Chassis and detached parts	25%	15%
	Pesetas Per Kilo	Pesetas Per Kilo
Rubber manufactures including tires but not toys or water- proof fabrics	2.40 to 8	2 to 7

The tariff listed as the second is that which previously applied to American products. The rate now will be similar to that of the French.

CORRECTION

Through an error in the report of the filing of the Weiss suit against the Goodyear Tire & Rubber Co., which appeared in AUTOMOTIVE INDUSTRIES in the issue of Aug. 10, it was stated "the suit

claims the company's profits, if \$20,000,000 a year, will mean a bonus of \$5,000,000 in addition to the \$250,000 to the Kennedy company." The article also states that the profits were \$240,000,000 in 1919.

The \$5,000,000 bonus figure, it is pointed out, obviously should be \$500,000 and the \$240,000,000 profit item for 1919 should be (and was so stated in the plaintiff's petition) \$24,000,000.

FINANCIAL NOTES

Spicer Manufacturing Corp. reports net profits of \$498,968 for the quarter ended June 30, 1922. After expenses and interest charges are deducted this is equivalent after preferred dividends to \$1.40 a share earned on common. Sales amounted to \$2,889,221, cost of sales \$2,194,321 and administrative selling and general expenses, \$124,411. Preferred dividends amounting to \$60,000, leaving a surplus of \$438,968.

Hayes Wheel Co. reports net earnings of \$150,381 for July, as compared with \$125,242 in July last year. For the seven months the total was \$640,712, compared with \$309,395 to the close of July a year ago. Current assets as of July 31 were \$3,764,609 and current liabilities \$1,139,081. The usual quarterly dividend of 50 cents a share payable Sept. 15 to holders of record Aug. 31 has been declared.

Moreland Motor Truck Co., Burbank, Cal., is offering a new issue of \$1,000,000 additional stock, equally divided between common and 7 per cent cumulative participating stock, both of \$10 par value, which will about double the company's capitalization. The Moreland company has eight direct factory branches in California and one in Washington. It employs 400 persons.

B. F. Goodrich Co. will call for redemption on Oct. 1 all of the five year 7 per cent convertible gold notes now outstanding at 103 per cent which were issued under the trust indenture dated April 1, 1920, made with the Bankers Trust Co. of New York. After Oct. 1 interest on these notes will cease.

Stewart-Warner Speedometer Corp. has called for redemption Sept. 1 at par and a premium of 4 per cent and accrued interest all of the outstanding five year 8 per cent convertible bonds, which total \$1,667,000.

Wisconsin Top Manufacturing Co. of Racine, Wis., has increased its capital stock to \$600,000, consisting of 5,000 shares of common and 1,000 of preferred with a par value of \$100 each.

Van H. Cartmell, Former Tire President, Is Dead

SPRINGFIELD, OHIO, Aug. 23—After an illness of two years from heart trouble, Van H. Cartmell, aged 72, former president of the Kelly-Springfield Tire Co., died to-day at the home of his son, Robert Cartmell. Cartmell became identified with the company in 1894 as general sales agent at Boston. In 1903 he was elected president and in 1920 retired from the company. Cartmell is survived by his widow and three sons, Van H. Cartmell, Jr., of New York City, Carl Cartmell of Buffalo and Robert Cartmell of Springfield.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week call loans covered a range of 3 per cent to 4 per cent, as compared with 3½ per cent to 5 per cent in the previous week. The situation remained comparatively quiet for fixed date maturities, although considerable business was transacted in the shorter maturities. The quotations were 3½ per cent for 30 days, 3¾ per cent to 4 per cent for 60 days, 4 per cent for 90 days, as compared with 4 per cent to 4¼ per cent for all three maturities in the previous week. Four and five months' maturities continued at 4 per cent, and six months at 4¼ per cent to 4½ per cent. No very large individual transactions were noted. The prime commercial rate remained unchanged at 3¾ per cent to 4 per cent.

On Aug. 14 the Kansas City Reserve Bank reduced its rediscount rate from 5 per cent to 4½ per cent on all classes of paper, and on Aug. 15 the Minneapolis institution announced a similar reduction. With the exception of the 4 per cent rate now maintained by the Boston, New York and San Francisco banks, the Federal Reserve Banks have a 4½ per cent rate.

The increased failures in the South and West last week overbalanced the decrease noted in the East and Pacific sections, and thus a total of 415 failures was recorded as compared with 402 in the previous week and 357 for the corresponding week a year ago. Of this number insolvencies involving liabilities of \$5,000 or more amounted to 235 or 56.6 per cent of the total, as compared with 248 or 61.7 per cent in the previous week, and 188 or 52.3 per cent for the corresponding week in 1921.

During the month of July, wholesale and retail costs of food and other commodities took a turn upward, according to the Bureau of Labor index; retail prices averaging a 1 per cent increase and wholesale a gain of 3½ per cent, as compared with June prices. As compared with July, 1921, the general price level advanced about 10 per cent, the largest increase being that of 36½ per cent for the cost of fuel and lighting.

After June's record figure for the current year, bank clearings for July at 111 cities, amounting to \$30,674,990,000, showed a decrease of a little more than 7 per cent. This total is, however, an increase of 16 per cent over that for July, 1921.

NEW OLDSMOBILE BODY

LANSING, MICH., Aug. 22—Production has started on a new Oldsmobile body which will be mounted on the standard, four-cylinder chassis. The body is a brougham and will sell at \$1,425, f.o.b. Lansing. The body is designed to seat five passengers, the entrance being to the front compartment and by means of a tilting front seat to the rear compartment.

INDUSTRIAL NOTES

Seaman Body Corp. of Milwaukee, in which Charles W. Nash holds an important interest, has let all contracts for the erection of extensions which will increase the capacity about 100 per cent by Nov. 15 or Dec. 1. The present plant was erected a little over two years ago, when the old W. S. Seaman Co. of Milwaukee formed a community of interest with the Nash interests, the outgrowth of which was the Seaman Body Corp. The extension will consist of an ell-shaped four-story building, 100 x 423 and 325 x 100 ft., of concrete and brick and will cost about \$400,000 fully equipped. Harold H. Seaman is secretary of the company.

Wico Electric Co., Springfield, Mass., manufacturer of motorcycle batteries and magnetos for stationary engines, has received bids for a new building to be started Sept. 1 and completed by the beginning of 1923. It will be a one-story structure, 400 x 90 feet and the first of five units. The company is now doing a business exceeding that of the peak of production in the wartime period, and purposes to double its employment force upon occupation of the new building. It is stated that contracts now in hand or in negotiation are sufficient to run the plant through 1923.

Kissel Motor Car Co. of Hartford, Wis., has started construction work involving \$100,000 on a large power plant and boiler house which will supplant its present heat and power generating system. Three 300-hp. Sterling boilers will be installed, together with additional dynamos, generators, and other equipment. The Kissel plant also is undergoing general improvement and enlargement, the present construction including new dry kilns and lumber curing facilities for the wood-working and body shops, wherein all Kissel passenger car and motor truck bodies are built.

Western Reserve Cotton Mills Co. of Georgia, manufacturer of automobile tire fabric, advises that the new machinery to be installed in the Millen, Ga., plant represents an investment of about \$75,000, and will almost double capacity of the plant. Tire demand has increased so rapidly of late that officials of the company state they are unable to keep up with demand though the mills are operating day and night.

Fernald Manufacturing Co., Inc., has taken over the business of the Clear-O-Scope Co., Angola, Ind., thus adding to the Fernald line the Clear-O-Scope windshield cleaner, which is largely sold in the original over-the-top type. In addition to this model the Fernald company has taken over the newly perfected Clear-O-Scope standard models, which will shortly be put on the market.

LaCrosse Motors Equipment Co. has been established in LaCrosse, Wis., to specialize in the manufacture of a new design of piston ring, known as the LaCrosse Triple Seal. The men interested are Jerome H. Chopiska, J. V. Nigro and Frank Chopiska, formerly with Chopka Piston Ring Co., Auburn, Ind.

Wilson Foundry and Machine Co., is building an addition to the transformer house at its plant in Pontiac. It will be 40 feet square, of fire-proof construction.

Lancaster Tire & Rubber Co., Columbus, has installed machinery and made factory extensions which has brought the output of the plant to 1200 tires daily.

ELECTRIC SHOW IN OCTOBER

NEW YORK, Aug. 22—The annual electrical and industrial exposition will

be held at the Grand Central Palace, Oct. 7 to 14. As in former years electric trucks and passenger cars with their accessories will form an important department of the show. Incidental to the exhibitions a parade of electric trucks will be held on Oct. 10. The purpose of the parade is not so much to show the different styles of electric vehicles as to demonstrate what the electric is doing for the solution of traffic problems.

Selden Features Name of All Truck Branches

ROCHESTER, N. Y., Aug. 22—The building and facilities of the Hartnett-Stewart Motor Co., Chicago, have been taken over by the Selden Truck Corp. and will be operated as a direct factory branch. The branch will be known as the Selden Sales & Service Co., with James W. Stewart as branch manager.

The Hartnett-Stewart Co. has represented the Selden Truck Corp. in Chicago since the first of the year. The Selden Sales & Service Co. will be a combination of the Atlas Truck Corp. and the Selden Truck Corp. branches. J. Ira Hartnett will remain as Selden sales manager and Randall H. Crouse will be the Atlas sales manager.

At Philadelphia, the Atlas Truck Corp. branch has been united with the Selden branch to operate as the Selden Sales & Service Co. handling both Atlas and Selden trucks. George H. Covert will remain as branch manager in charge of Selden sales. H. A. Woodruff will continue in charge of Atlas sales.

At York, Pa., another branch operated as the Selden-Atlas Sales & Service Co. has been opened with H. M. Heiges as manager.

Nine branches are now in operation.

Massachusetts Limits Total Truck Weights

BOSTON, Aug. 18—A Massachusetts law effective next month places at the discretion of local officials the use of trucks on the public highways where the weight of vehicle and load exceeds 10,000 pounds.

Out of all the 50 bills introduced, the legislature passed but five. The truck law was a compromise. After the big fight on motor truck fees and a tax of one cent on gasoline ended in the defeat of these measures, the Department of Public Works centered its efforts on a bill to lower the weight limit, which now allows 28,000 pounds.

A bill was under consideration to cut this down to 20,000 pounds. As the department urged a lower limit on the ground that heavy trucks were destroying the roads, especially in the spring, the compromise was granted to allow holding up heavy traffic, if necessary, at that time. The law stipulates that local officials shall determine when the trucks of 10,000 pounds or more shall be kept off the roads.

Another law declares that no tail light shall be used on any motor vehicle until approved by the motor vehicle registrar.

METAL MARKETS

Recent price advances by the leading interests in the steel market, while expressive of the higher production costs forced upon the steel industry by the coal strike and other adverse factors, were not made for the purpose of attracting new business. Ordinarily an announcement of higher prices brings out a certain amount of new business, many buyers assuming that the tendency of the market is in an upward direction, and so they prefer covering their requirements at the first advance to waiting whether others will follow or not. In the present condition of the industry, however, producers are not figuring on any fresh demand developing over the next few months. They have enough orders on their books to keep their plants in operation at the curtailed rate of production which scarcity of fuel and, in a few instances, efficient mill labor have brought about.

The higher prices recently announced by the leading interest's sheet mill subsidiary are therefore, different in purpose. In the first place, they serve as an incentive to consumers who have placed orders at \$2 to \$5 a ton lower figures than the new levels to accept shipments of this material and not to ask for deferment of deliveries. Then again these advances, although the resulting prices are strictly nominal in character, serve to give producers a more advantageous position when there comes a revival of demand and a new market is being made.

In some quarters it was even said that price advances by many of the producers might be looked upon as a convenient means of keeping buyers away. That, however, is a palpably faulty conclusion. The mills are naturally anxious to fill the orders which they have on their books, and until coal becomes more plentiful, they will have to strain all their resources to fulfill the obligations to which they are committed. If there were, however, any consumers ready to talk November or December shipments, many mills would be only too glad to listen. The trouble is that consumers' operating schedules have been so upset that many of them are far more perturbed about securing postponement of steel shipments than about their requirements eight or ten weeks hence. The future of the industry is wrapped up in the coal and transportation situation.

Pig Iron.—It is a large question whether the output of pig iron is shrinking more rapidly than the demand. High prices are being quoted, but many automotive foundries enjoy special consideration as old customers. The market generally rules 50 per cent higher than it did a year ago.

Steel.—Producers state that quite a few automotive consumers have asked postponement of steel shipments because of their inability to obtain fuel for maintenance of their operating schedules and, in some instances, because steel urgently needed is not coming forward which makes shipment of other steel parts a waste of effort. The price for sheet bars is up in the air. Nominally \$35 is still quoted but expectations are for a \$37 to \$39 market. Forging bars, cold-finished bars and cold-rolled strip steel are firm without much automotive demand.

Aluminum.—Passage of the new tariff law by the Senate has caused somewhat greater activity in the aluminum market. Some business has been done in sheets as well as in ingots. The heavy stocks of the latter operate against what might otherwise be a sharply advancing market.

Copper.—The market is quiet and steady.

Calendar

SHOWS

- Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.
- Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.
- Sept. 23-30—New York, Closed Car Show, Grand Central Palace.
- Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.
- Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.
- Nov. 13-18—Chicago, Annual Show and Meeting of the

Automotive Equipment Association.

- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.
- Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibition in Connection with the Brazilian Centenary As-

sociação Automobilista

- Sept. 15-20—The Hague, Automobile Show.
- September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.
- Oct. 4-15—Paris, Automobile Show, Grand Palais.
- Nov. 3-11—London (Olympia), Automobile Show.
- Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.
- November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.
- Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquanteinaire.

- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

- Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

- Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

- Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

- Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

- Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

CONVENTIONS

- August 28-Sept. 2—Detroit National Safety Congress.

Australian Market Waits Development

WASHINGTON, Aug. 21—A revival of the automobile business in Australia has been reported to the automotive division of the Department of Commerce by the American Consul at Melbourne. Import figures to that country show that during the past twelve months the imports have fallen to pre-war numbers. The automotive industry in Australia, insofar as the domestic production is concerned, is still confined to body building and the assembling of cars from imported and locally manufactured parts.

Body building is encouraged by high tariffs on imported bodies and a regulation prohibiting the entry of more than one automobile body to every three chassis and one truck body to every five chassis. As a result of this prohibition approximately 95 per cent of the cars imported arrive without bodies.

Motor Vehicle Use in Infancy

The potential market for automotive products is very large as the use of motor vehicles is yet in its infancy, the horse still being the principal means of conveyance, outside the principal cities. Automobiles are being used, however, in place of railroads and bus lines are being developed as a means of transportation between new districts and the cities, where ordinarily a railway would serve their transportation needs. The indications are, however, that because of the first cost in favor of the bus transportation the development of automotive transports is progressing fast.

It is estimated that the replacement market averages about 2,000 cars per year. Although Australia ranks fourth among the countries of the world in the number of cars per capita with one person in sixty-four owning an automobile,

the registration amounts to only 78,517. Within the past three months the imports of passenger cars from the United States and Canada has totaled over 1000 per month.

The principal demand during 1922 and 1923 will be for medium priced cars, accessories and all classes of material for body building and fitting, the report states.

Maxwell Is Using Canal in New York Shipment

DETROIT, Aug. 23—Shipment of 40 automobiles from the Maxwell plant by an all water route through the New York State barge canal and thence down the Hudson to the Colt Stewart Co., New York City, will be made the subject of considerable publicity by the State of New York in its campaign to show the practicability of the barge canal for all water shipments to the seaboard from Great Lakes cities.

The publicity attending the shipment is not supported by factory officials because of the strong feeling which Detroit shares with other Great Lakes cities for the development of the St. Lawrence River project which would open the lake to sea-going vessels. The State of New York, however, has seized the opportunity to back its opposition to the St. Lawrence project by making the shipment the subject of favorable barge canal propaganda.

The activity of state officials has been somewhat upset by the sinking of the tug which was drawing the barges while enroute through the canal, fortunately, however, without damage to the barge upon which was carried the automobile shipment. The trip was resumed with the arrival of another tug and the automobiles will in due course of time reach New York.

Belgian Grand Prix Won by De Tornaco

BRUSSELS, Aug. 14 (By Mail)—De Tornaco, on an Imperia-Abadal, won the 183 cu. in. class in the Belgian Grand Prix road race, by covering 372.8 miles in 6 hrs. 44 min. 38 sec., thus averaging 55.2 m.p.h. Lagache, on a French Chenard-Walcker, was the second man home in 7 hrs. 17 min. 16 sec. In the 122 cu. in. class the only car to finish out of four starters was a four cylinder Bignan, driven by Gros, who averaged 47.8 m.p.h.

As a race the Belgian Grand Prix was disappointing. The rules, which limited the number of cylinders to four, the number of valves to two per cylinder in the 122 cu. in. class, and called for four seater bodies in the 183 cu. in. class, were responsible for the small number of entries.

The team of Metallurgique cars, in the 183 cu. in. class, went out early with broken connecting rods. Dery's Imperia-Abadal had cardan joint trouble; Dauvergne broke a valve cotter on his Chenard-Walcker and for three-quarters of the distance only the winner and Lagache on Chenard-Walcker were in the race. The latter finished on three cylinders, owing to a broken valve.

Moline Companies Active

MOLINE, ILL., Aug. 23—Survey of industrial conditions in the Moline manufacturing field this week indicated a steady revival of business and the prospect of continued increases. Deere & Co. is headed toward a full-time full-force production schedule; Moline Plow Co. expects marked increase within two months; the reorganization of the Stephens Motor Co. is expected to be "turn in the tide" for that company.